Railway Maintenance Engineer

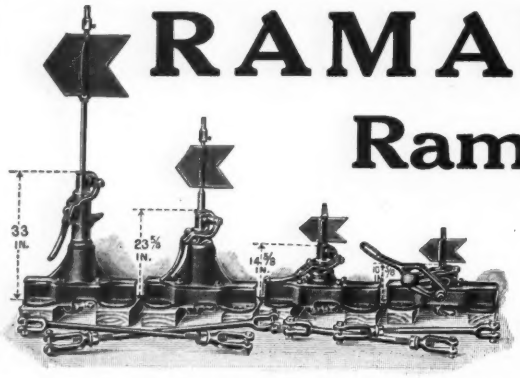
me 13 | CHICAGO: Transportation Building NEW YORK: Woolworth Building | AUGUST, 1917 | CLEVELAND: Citizens' Building WASHINGTON: Home Life Building | Number 8

m gulf to gulf-
n ocean to ocean
n the arid sands
frica to the snow
nd stretches of

Siberia-the sun never sets on the Bonzano-Thomson Rail Joint-a graphic illustration of rail-joint supremacy

BONZANO-THOMSON
RAIL JOINT
"The Joint As Strong As The Rail"
The Q and C Co.
Q AND C
w York: 90 West St. St. Louis: Railway Exchange Bldg. Chicago: Peoples Gas Bldg.

RAMAPO



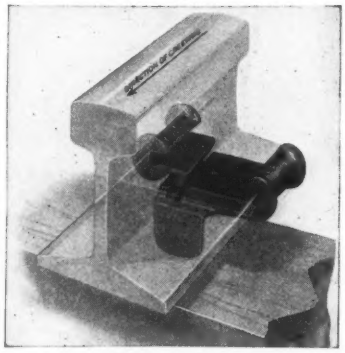
Automatic Safety Switch Stands are Manufactured only by the

Ramapo Iron Works

Write for Descriptive Catalogues on
Switch Stands, Switches, Frogs, Guard Rail Clamps, Etc.

Manganese Track Work a Specialty.

Ramapo Iron Works Main Office: HILLBURN, N. Y.
WORKS: Hillburn, N. Y., and Niagara Falls, N. Y.



THE P. & M.

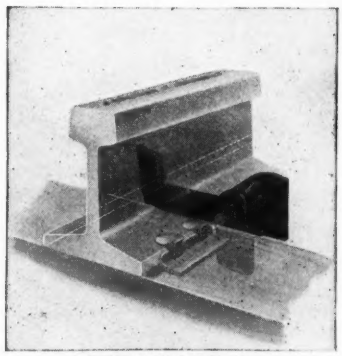
RAIL ANTI-CREEPERS

EFFECTIVE — EFFICIENT
UNIVERSALLY USED

THE P. & M. CO.

RAILWAY EXCHANGE
CHICAGO

NEW YORK ST. PAUL SAN FRANCISCO DENVER



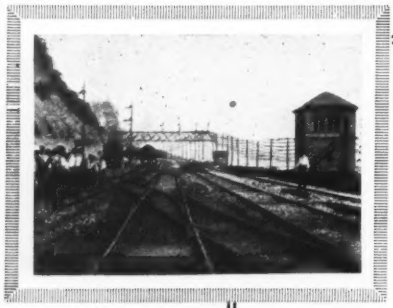
THE VAUGHAN

ESTABLISHED 1882

THE WEIR FROG CO.

Track Work of Rail and Manganese Steel Construction

CINCINNATI --- --- --- --- --- OHIO



Cincinnati Frog & Switch Co.

Manufacturers of Track Equipment

For Steam and Electric Railroads, Mines and Mills

CINCINNATI, OHIO

Frogs Switches Crossings Stands

Safeguard Your Water Service with Golden-Anderson Automatic Valves

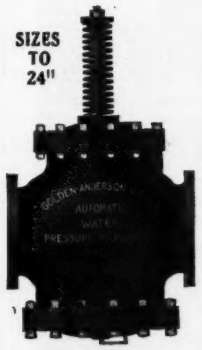
G.-A. Pat. Cushioned Controlling Altitude Valves

Automatically maintain Uniform Stage of Water in Tank, Reservoir or Standpipes. Do away with the Annoyances of Valves or Float Fixtures inside or Float Fixtures outside of tanks.

"Three Ways of Closing Valves."
1st—Automatically by water.
2nd—By Electricity, if desired.
3rd—By Hand.

"No Metal-to-Metal Seats"

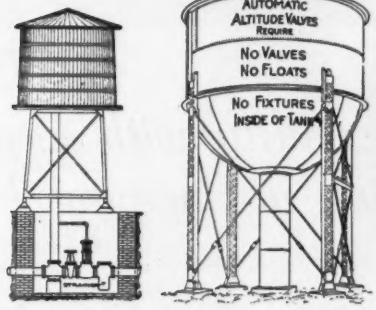
"Hosts of References"

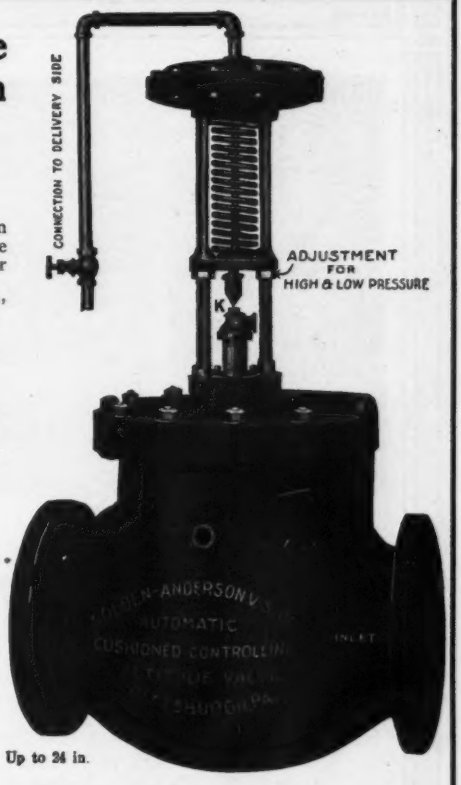


Golden-Anderson Patent Automatic Cushioned Water-Regulating Valves.

(Angle or Straight Way), up to 24 in.

Golden-Anderson Automatic Cushioned Float Valves.





Up to 24 in.

Golden-Anderson Valve Specialty Co.

1200 Fulton Bldg. Water and Steam Specialties. PITTSBURGH, PENNA.

Keystone Tool Grinder

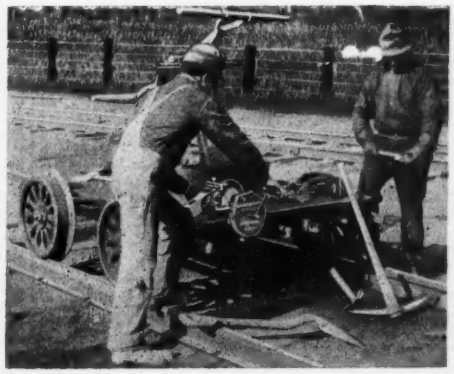
Sharp Tools Mean More and Better Work

The Keystone Tool Grinder saves the time and trouble of sending tools back to the shop.

Tools can be accurately and correctly edged right on the job by any unskilled laborer.

Monarch Adze Attachment

This attachment will hollow-grind adzes with a perfect cutting edge, and is adjustable to any bevel required, also free from danger of drawing the temper.



One for Every Gang

The Original Tool Grinder Designed for Railroad Use—There is no grinder on the market, irrespective of price, that will do the work of the Keystone and its attachments. *Make us prove it.*

If your road has not adopted the Keystone Grinder, use one for six months at our expense. If you do not find it *superior* and more satisfactory in every respect than any other grinder on the market—it costs you nothing.

Write Today for the Railway Bulletin

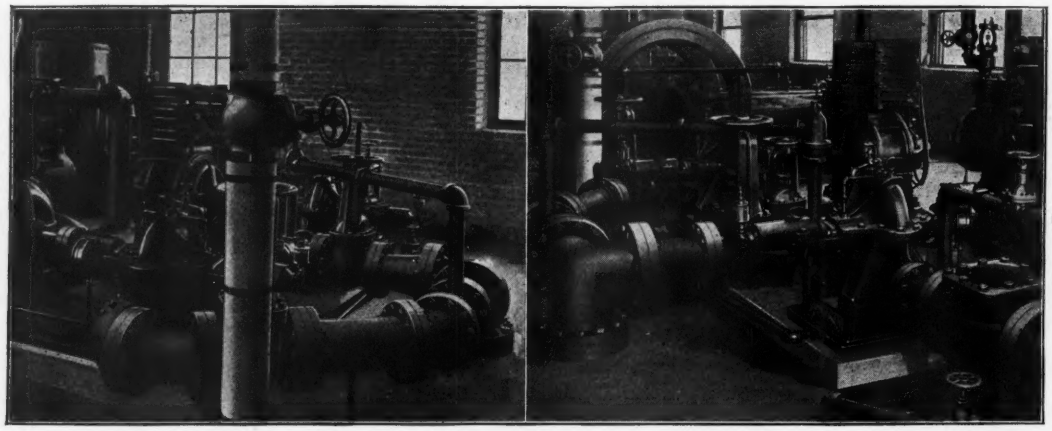
Keystone Grinder & Mfg. Co.

PITTSBURGH, PA.

Keystone Features

Absolutely simple; only two gears; nothing complicated; complete set of attachments, the simplest ever designed. End-tapered shaft, handle cannot work loose; tool rest adjustable to any position, cannot work loose; absolutely dust-proof bearings; requires oiling but once a year. High speed; geared 16 to 1; little hand power required; no fatigue. Compact, portable; built for strength and efficiency.

AMERICAN



Combining Flexibility with Economy in Modernizing a Pumping Plant

How a modern pumping plant not only maintains high efficiency, but is adapted for the widest range of service.

The City of Rochelle, Ill., own and operate their light, power and waterworks plant. Recently they decided to replace duplex double-acting steam pumps, for supplying the city with water from surface reservoir into distributing system and elevated tank, with more modern pumps.

The new installation consists of two "American" 4-inch, type DSMD, horizontally split volute, single-stage centrifugal pumps direct connected through flexible shaft couplings to 35 h.p., 3-phase, 60-cycle, 220-volt General Electric slip ring motors, designed to operate at 1750 r. p. m.

Each pump was designed to have a capacity of 500 g. p. m. when operating under a total head of 140 feet and has a mechanical efficiency of 68 per cent.

These pumps are fitted with pipe connections which permit them to be operated singly or in parallel for domestic service or in series for fire pressure.

The accompanying illustrations show two views of this installation. Note that while an installation of greatest flexibility is provided, the entire equipment occupies very small space; also that the efficiency is high for pumps of so small a size.

The ability to combine great economy of operation with greatest flexibility of service is rapidly popularizing this type of pumping installation with discriminating users.

Catalog 149 describes these pumps. Write for it.

The American Well Works

General Office and Works: Aurora, Ill., U. S. A.
Chicago Office: First National Bank Bldg.

District Sales Agencies:

New York City (Domestic and Export)
Philadelphia, Pa.
Pittsburgh, Pa.
St. Paul, Minn.
San Francisco, Cal.
Los Angeles, Cal.
Lincoln, Nebr.
Birmingham, Ala.
Artesia, New Mexico
Dallas, Texas
Montreal, Canada
Chatham, Ont., Can.
Edmonton, Alta.
Salt Lake City, Utah
Denver, Colo.
Kansas City, Mo.
Joplin, Mo.
St. Louis, Mo.
Calgary, Alta.

How many of your water columns are knocked down every year?

What do the repairs and maintenance—not the result of ordinary use—cost you?

Avoid this annoyance, trouble and expense by using a

POAGE Style "H" *WATER COLUMN with* FENNER DROP SPOUT

The three foot lateral range in the Fenner spout and the steel riser in the Poage Style H save the water column from being knocked down by the shifting of the tender.

The tender has to leave the track to knock this column down.

The flexible spout makes it unnecessary to spot the tender accurately. You save time by quick adjustment.

The five foot up and down range enables the water column to fill a tender of any height.

The open telescopic joint does not waste a drop of water. It banishes the usual winter time troubles. Ice does not collect upon it.

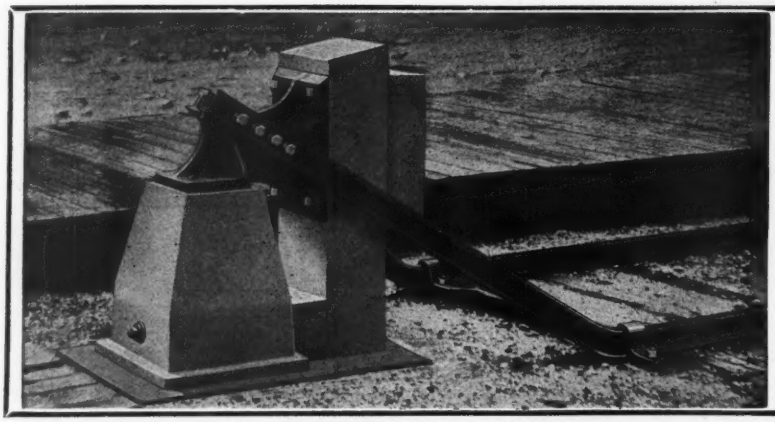
The valve permits the maximum amount of water to flow in the shortest time. There is a minimum of frictional resistance. It shuts the water off quick without water hammer.

Try the Poage Style H column. You will find that it has remarkable operating advantages.

MANUFACTURED EXCLUSIVELY BY

THE AMERICAN VALVE & METER CO.

CINCINNATI, OHIO



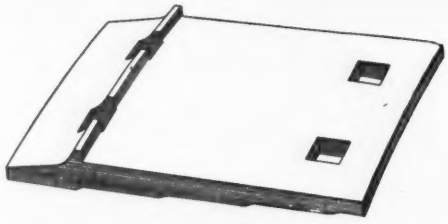
ELLIS

PATENT

Bumping Post

Simple, Strong and Lasting
Adapted to All Positions

Mechanical Manufacturing Co.
Chicago, Ill.



THE LUNDIE TIE PLATE

The Lundie Tie Plate is widely acknowledged by railroad men having such plates in track, as promoting decided economy in rail wear, in holding track to gauge and in giving easy riding track. It will far more than pay for itself in reduction of Operating Expenses.

The features of the plate are—a sloping seat inclining the rail, so reducing abrasion and internal stresses in the rail to a minimum—a true camber promoting easy riding—and a bottom as shown in the cut, so seating itself on the tie that the track is held firmly to gauge without injury to the tie.

The combination of these features, or their mechanical equivalent, is covered by Letters Patent, supported by other Patents covering certain individual features of the plate. Railroad Companies pay no royalties on its authorized use.

The undersigned, as the original promoter of the principles embodied in the Lundie Tie Plate, offers plates for sale in fair competition with any other plate in the market, depending on its proven merits for its extended use.

JOHN LUNDIE, 52 Broadway, NEW YORK

Does your company look to you to increase track efficiency and reduce maintenance costs? Then the results of tests made by a number of prominent roads on the only **self-tightening track nut** ever produced—

The Roller Lock Nut

will interest you. These nuts were installed on some of the worst stretches of track and the results were so good that many of these roads now specify Roller Lock Nuts for crossings, frogs and switches. Easier to apply than friction nuts and washers. No counter nut required. Can be re-used indefinitely. Cheaper than hot pressed nuts and washers in the end. Ask for samples or demonstration.

ROLLER LOCK NUT CO., Inc.
61 Broadway **New York, N. Y.**

Capacity, 60,000 gallons. Height, 36 ft. 8 in. to top.

STEEL RAILWAY SERVICE TANKS

FOR

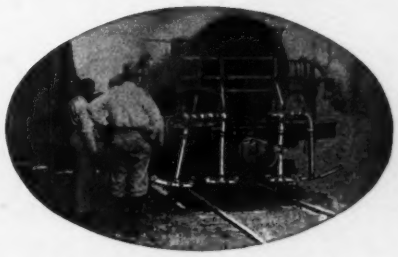
PERMANENCE AND NEGLIGIBLE MAINTENANCE COST

WRITE FOR RAILWAY BOOKLET NO. 28

We manufacture and erect Elevated Steel Tanks and Standpipes for every service

Des Moines Bridge & Iron Co.
Des Moines, Iowa, 912 Tuttle St.

Pittsburgh-Des Moines Steel Co.
Pittsburgh, Pa., 920 Curry Building. New York City, 55 Church St. San Francisco, Cal., 5000 Rialto Building. Chicago, Ill., 1290 First National Bank Bldg. Havana, Cuba, Room 165 Nova Scotia Bank Building. Dallas, Texas, 1285 Praetorian Building. Chatham, Ont., 299 Inshes Ave.
Plants—Pittsburgh, Pa. Des Moines, Ia. Chatham, Ont.



The Ultimate of Efficiency

TRACKOLINE

"The Weed Killer"

To kill vegetation on that Right of Way of yours you need just one thing—**the cattle-proof chemical TRACKOLINE.** No expensive equipment, no expert knowledge of *"Weedology"* are required when Trackoline "The Weed Killer" is employed.

As to the Sterling Sterilizing Efficiency—the *Ultimate Efficiency* of Trackoline. Note these words of an official of a prominent railroad—*"By the end of the week the weeds were all dead, and the track stayed absolutely clean for the balance of the season."*

What is the use of being troubled with a weed problem this year? Why allow the expenditure of large sums for weed burning and hand weeding, when by the use of Trackoline you can secure *the Ultimate of Efficiency and Economy.*

Send today for Trackoline Tracts or Facts on Clean Tracks and Lean Expenditures for the Prevention of Vegetation. The little booklet with a big message which points the way to big savings in your fight against weeds. The book which fully describes

A PROVEN METHOD OF WEEDING TRACK

Protective Materials Corp.
Vanderbilt Bldg., 51 E. 42d Street, New York

The Real Test

of a crossing is its ability not only to stand up under all conditions of service at a low maintenance cost, but also at the same time to stay in such condition that an early renewal will not be necessary. Several years' continuous service show that the

Eymon Continuous Crossing

fulfills the above conditions. It provides smooth rails and eliminates the cause of the pound. It reduces the maintenance costs—it does not get out of alignment and provides greater safety to both rails and equipment. Write for the facts.

Eymon Continuous Crossing Co.
MARION, OHIO.

KILBY FROG & SWITCH COMPANY

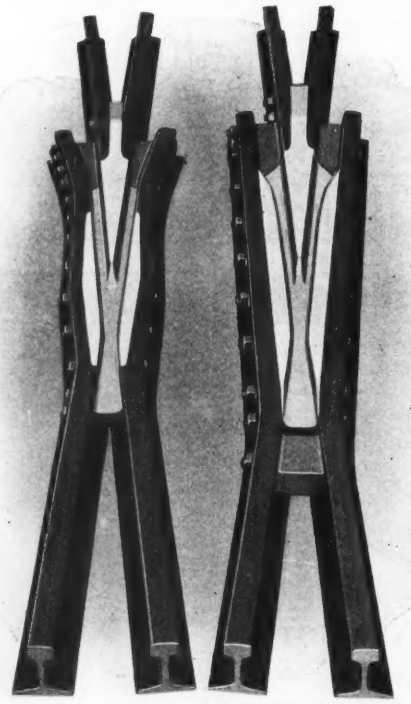
Birmingham, Alabama

Manufacturers of

Frogs, Switches, Crossings, Etc.

Manganese Track Work a Specialty

TISCO
Manganese Steel



Wharton A-91 Frog M.T.S. Standard Frog

Showing You How the

M.T.S. Standard Rail-Bound Manganese Frog

Compares with a type of frog which has been quite popular for many years and used very extensively—our Design A-91.

Note the much more generous proportions of the Manganese Steel casting in the M.T.S. Frog; added strength through wing rails not being notched to receive casting; absence of strain on bolts due to casting containing guard flares, and more of the throat; heavier heel-block extension; general straight lines throughout, facilitating accuracy in fitting.

Adopt the M.T.S. as Standard

Detail drawings of the M.T.S. Frog, of any standard angle, from No. 4 to No. 20, gladly furnished upon request.

Manufactured by

Wm. Wharton Jr. & Co., Incorp.
EASTON, PENNA.

Where

INTERNATIONAL
STEEL CROSSING FOUNDATIONS

Are Being Installed This Year

Atchison, Topeka & Santa Fe Ry.,
Geneva, Seneca Falls & Auburn Ry.,
New York, New Haven & Hartford R. R.,
Boston Elevated Railway,
Boston & Albany R. R.,
Cincinnati, New Orleans & Texas Pacific Ry.,
Louisville & Nashville R. R.,
C. C. C. & St. L. Ry.,
Springfield (Ohio) Ry.,
American Railways,
New York, Ontario & Western Ry.,
Lake Erie & Western R. R.,
Union Traction Company of Indiana,
Tri City Ry.,
New York Central & Hudson River R. R.,
Chicago, Rock Island & Pacific Ry.,
C. & E. I. R. R.,
Central New England Ry.,
Louisville Ry.,
Terre Haute, Indianapolis & Eastern Traction,
Mason City & Clear Lake R. R.,
Minneapolis & St. Louis R. R.,
Decatur Ry. & Lt. Co.,
Wabash Railroad,
Danville Ry. & Lt. Co.,
Denver Tramways,
Lewiston, Augusta & Waterville St. Ry.,
Maine Central R. R.,
Reading Transit & Lt. Co.,
Philadelphia & Reading Ry.,
Chicago Great Western R. R.,
Missouri Pacific Ry.,
Illinois Traction System,
Kentucky Traction & Terminal,
Queen & Crescent Route,
B. & O. S. W. R. R.,
Cincinnati Traction,
Stark Electric Ry.,
Pennsylvania Lines West of Pittsburgh,
Wheeling & Lake Erie R. R.,
Southern Pacific.
Northern Ohio Traction & Light Co.

Is your company's name in the list? These companies are protecting their crossing frog investments.

Let us show you why, and how moderate the cost.

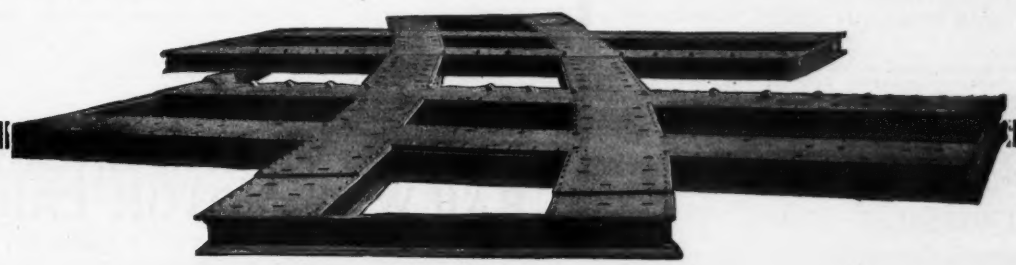
The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES

Western Eng'g Sales Co., Los Angeles, Cal. | San Francisco, Cal. Seattle, Wash. | R. J. Cooper Co., Salt Lake City, Utah | J. E. Lewis & Co. Dallas, Texas. | Maurice Joy, Philadelphia. | William H. Ziegler, Minneapolis, Minn.



FAIRMONT

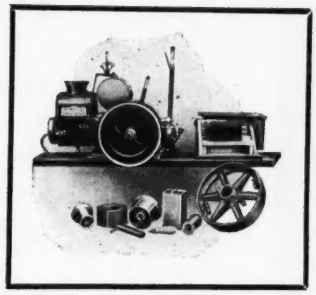
Handcar Engines and Railway Motor Cars

Have been "popularized" by more than 11,000 track men on more than a half thousand railroad systems because QUALITY and SERVICE are incorporated in every engine built at the FAIRMONT factory.

This is proven every day by the large number of letters received from satisfied owners of FAIRMONT Handcar Engines and Motor Cars.

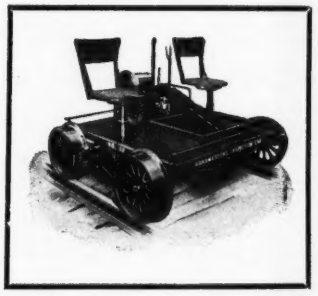
The small original cost of these outfits and the still smaller maintenance cost, coupled with their simplicity of construction and operation, wonderful power and many patented features, makes them worthy of your investigation.

In this day of labor shortage you can't afford to waste energy pumping handcars. Every FAIRMONT equipped handcar means from one to three hours' MORE work per section each day. Does it pay? —Well, draw your own conclusion. In the meantime send us the attached coupon so we can mail you some interesting information.



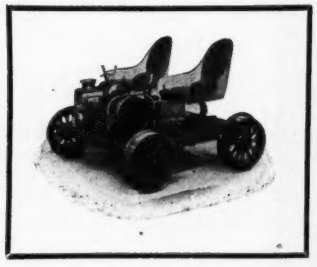
Fairmont Handcar Outfit

Makes an efficient, time-saving motor car of any hand or push car, with little labor.



Fairmont No. 12 Inspection Car

This car is popular with Roadmasters, Superintendents, General Managers, etc.



Fairmont All-Steel Featherweight Car

The lightest and fastest little motor car built.

FAIRMONT RAILWAY MOTOR CARS

Meet every requirement of railroad service. They are designed and built by a corps of experienced engineers who have made a special study of railroad motor car requirements.

All this study and experience goes into each and every FAIRMONT Motor Car. That's why they stand the heavy "grind" of railroad track work.

FAIRMONT Motor Cars are built in more than 50 different types and styles and are used in nearly every country in North and South America.

If we haven't the car for your work we can make it.

Fairmont Gas Engine & Railway Motor Car Co.
Formerly Fairmont Machine Co.
423 NORTH MAIN STREET, FAIRMONT, MINNESOTA

Gentlemen:
Please send me, without obligation, complete information about Fairmont Handcar Engines and your easy payment plan.

Name.....

Occupation.....

R. R.....

Address.....

R. M. E. 7-17

FAIRMONT GAS ENGINE & RAILWAY MOTOR CAR CO.
423 N. MAIN ST. FAIRMONT, MINN.

A Page Advertisement By Fairmont Owners

Grand Falls, Mont., Mar. 31st, 1917.
Dear Sirs: I have had my 6 HP. Fairmont 7 months and as yet have had no trouble. I ran it all winter without any trouble and if I ever buy any more engines they will be FAIRMONTS. They are just what you say about them.
Wm Tindell,
Bridge Foreman,
Minnesota & Int'l R. R.

Battleford, Sask., Feb. 26th, 1917.
Gentlemen: I have experience with several different makes of handcar engines but have found nothing that equals the Fairmont. Have never had a minute's trouble or a cent's expense and get from 50 to 55 miles on a gallon of gasoline. I have some bad grades here on my section, too.
A. B. Cedar, Sec. F.,
G. T. Pac. R. R.

Smithville, Tex., Jan. 31st, 1917.
Dears Sirs: I feel it is my duty to write you and tell you of the good service my 8 HP. FAIRMONT has given me the past two years.
I always carry a trailer and 18 men and from 400 to 600 pounds of tools, and with this load I get about 22 miles on a gallon of gasoline.
We have never had to push in yet, and that is what the boys like.
Wm. Baken,
B. and B. Foreman,
G. W. D.

Logan, N. Mex., Mar. 15th, 1917.
Gentlemen: My 6 HP. FAIRMONT engine has been running 17 months without failing me once, or a penny for repairs.
L. E. Marvin,
Sec. Fmn.. Rock Is. R. R.

Minneapolis, Minn., Mar. 7th, 1917.
Dear Sirs: I have had one of your 6 HP. engines in use on my motor car for the past two seasons. In 1916 I used it over 10,000 miles of track.
The only repairs I have had in that time is one timer brush, 50 cents. Considering the loads handled and the miles per gallon this is very good.
J. C. Williams,
Section Foreman.

Middleburg, Okla., Mar. 15th, 1917.
Dear Sir: I have had my FAIRMONT engine now two months and like it fine. I think it is the only engine for section handcars. It sure beats the old way bad.
With best wishes to the Fairmont Gas Engine and Railway Motor Car Co., I remain,
R. J. Hough,
Sec. Fmn., A. G. & S. F. R. R.

Minerva, Tex., Jan. 18th, 1917.
Gentlemen: I want to speak a good word for the Fairmont engine. I have had my engine two months and like it better every time I run it.
I got on it this morning with snow and sleet all over everything and had no trouble in starting it.
My roadmaster said I had the best car on the division.
Sam Deer,
Sec. Fmn., San A. & Ar. Pass R. R.

Lennox, S. Dak., Feb. 26th, 1917.
Gentlemen: I have run my FAIRMONT engine all winter and have never had to heat it once to start it.
I like it fine and would not buy any other make.
C. F. Ogden,
Sec. Fmn.. C. M. & St. P. R. R.

Swatara, Minn., Apr. 19th, 1917.
Gentlemen: I distributed over 3,000 ties this spring with my FAIRMONT car. I averaged 40 ties to the load and had to climb some pretty steep grades.
I would not want to part with my engine for ten engines of another make, for railroad work.
Richard Anderson,
Sec. Fmn., Soo Line.

Faithorn Jct., Mich., Apr. 20th, 1917.
Dear Sirs: I wish to recommend your little Mighty Fairmont engine (4 HP.) as the best engine I ever handled. It is always ready for use and there is no trouble starting. It certainly can lug a load and make good time.
Of all the other engines, totaling 17 in number, I have run, no one could buy this little Fairmont 4 HP. from me.
E. W. Wilson, Agt.

Canon Diablo, Colo., Apr. 26th, 1917.
Gentlemen: I certainly like my Fairmont engine, recently purchased from you. I have traveled 60 miles on one and one-half gallons of gasoline, part of the time on a low up-grade with a push car loaded with 20 ties.
Sanford Smith, Sec. Fmn.

Sorento, Ill., June 11, 1917.
Gentlemen: I received the 6 HP. FAIRMONT engine the 25th and put it into service the 26th, and will have to say it fills the bill O. K. I could not get a better engine for my work.
The longer I use the FAIRMONT the better I like it.
H. Dearing, Foreman.

Oglesby, Tex., June 2d, 1917.
Gentlemen: Received my engine O. K. on the 28th, in first class shape. I have tried it out and am highly pleased with it. The FAIRMONT is far ahead of the ——— engine.
R. H. Talley,
Foreman, St. L. S. of T. R. R.

Mumford, Tex., Mar. 1st, 1917.
Dear Sirs: I am well pleased with my 4 HP. Fairmont; it does my work fine. I believe it is the best 4 HP. engine I ever saw.
I have ten miles of track and from 8 to 10 men and can make from 20 to 25 miles an hour against any head wind.
Geo. B. Caldwell,
Section Foreman.

Mar. 23rd, 1917.
Dear Friends: I have been running my FAIRMONT engine 20 months now and my expense has been only $1.00.
I carry six men, tools and water keg, besides a push car, twenty miles every day. The engine has never failed me once.
R. B. Young, Sec. Fmn.

Wallace, S. Dak., Apr. 6th, 1917.
Dear Sirs: I have averaged 600 miles per month with my FAIRMONT 4 HP. engine for the past 17 months, making a total of 10,200 miles. My total expense for that time for repairs was only $1.70.
I am certainly well pleased with the engine.
Carl Hanson,
Fmn., M. & St. L. R. R.

Spring Lake, Mich., Apr. 30th, 1917.
Gentlemen: It just took me one hour to install my new FAIRMONT and get it running. I have had a motor car for five years and will say that the FAIRMONT has it all over the other two engines I have used.
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Lohrville, Ia., Apr. 13th, 1917.
Dear Sirs: The FAIRMONT is the most perfect little handcar motor I ever had anything to do with. The more I run it the better I like it.
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Shaw, La., Apr. 12th, 1917.
Gentlemen: I have one of your 12A Motor Cars and wish to say to you that, in my opinion, you have the best motor cars on the market and the most economical. I had spent about $100 trying to get a good motor car before I got yours. All I got was more engine trouble than I could overcome. I had to walk most of the time. Since I have been using one of your motor cars I have not had a minute's trouble. Any one wishing a testimonial from me regarding your engines and cars can certainly get it.
I. S. Palmer,
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Dears Sirs: I wish to say that there is no better engine made than the Fairmont. I had a chance to prove it to three officers of the Frisco R. R. a short while ago.
I took the three on a round trip of 110 miles without any engine trouble, on two gallons of gasoline, an average of 55 miles per gallon. This is the best record of any engine on this division.
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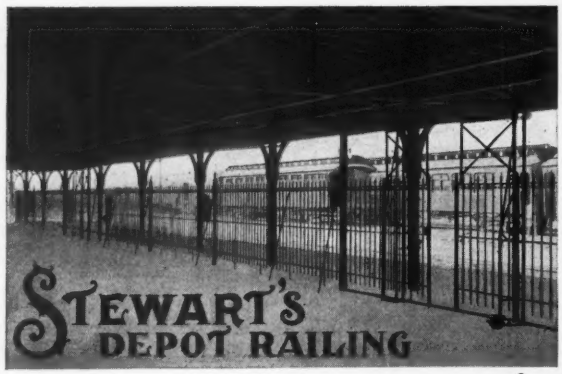

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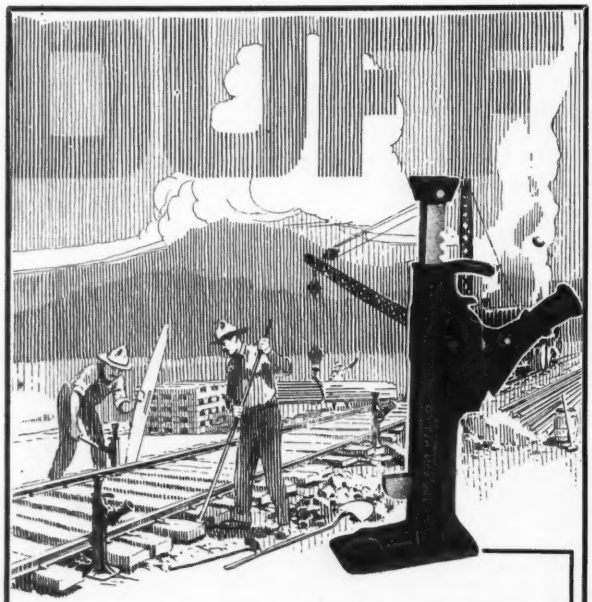

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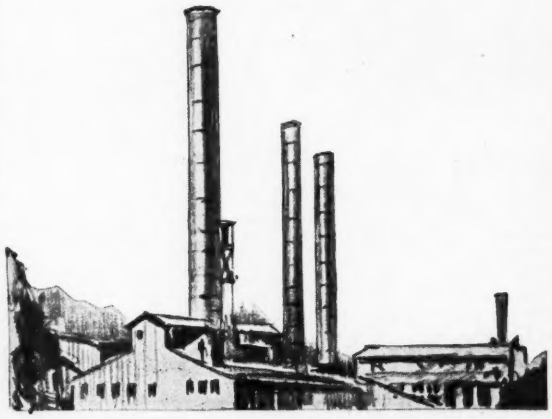

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Cordially yours,

Mr.Charles M.Mudge,
Service Engineer,
Mudge & Company,
Kansas City, Missouri.

BWM:A.

Send For Copy

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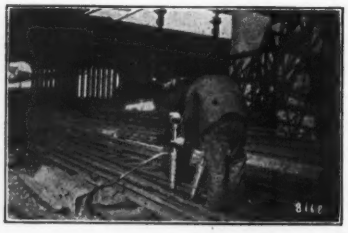

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B01

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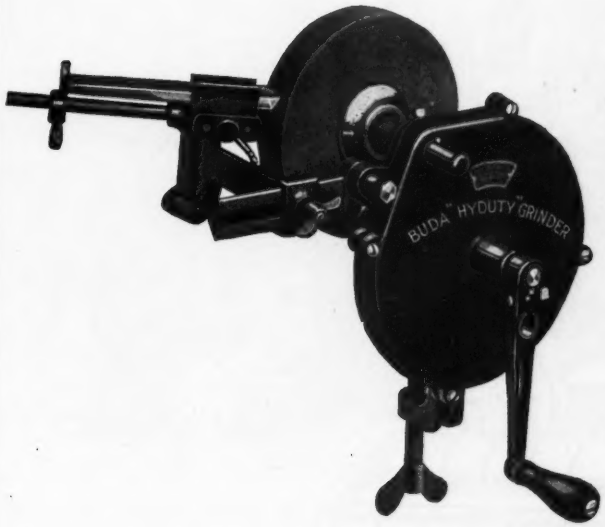

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A Buda Grinder in the tool box saves time—keeps tools always sharp—no necessity to return to section house or shop to sharpen your tools on a grindstone.

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Buda "Hyduty" is highest type of portable grinder—equipped with latest attachments for grinding Flat Bits, Twist Bits, Chisels, Adzes and Scythes—put up in different outfits to meet varying conditions.

Drill More Holes in Less Time

Don't use an ordinary ratchet drill with carbon twist bits—use the

Buda "HYDUTY" Paulus Track Drill

equipped with Celfor-Rich Spindle and Chuck with high speed flat bits—drills your holes in one-tenth the time.

Catalog No. 228 for the asking.

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Latest improved type.

Clamps rigidly to the rail. Prevents bit breaking.

Is quickly detached from rail by simply throwing a lever.

Frame of malleable iron, strongly reinforced. Light in weight.

Equipped with improved "Hyduty" Chuck and spindle.

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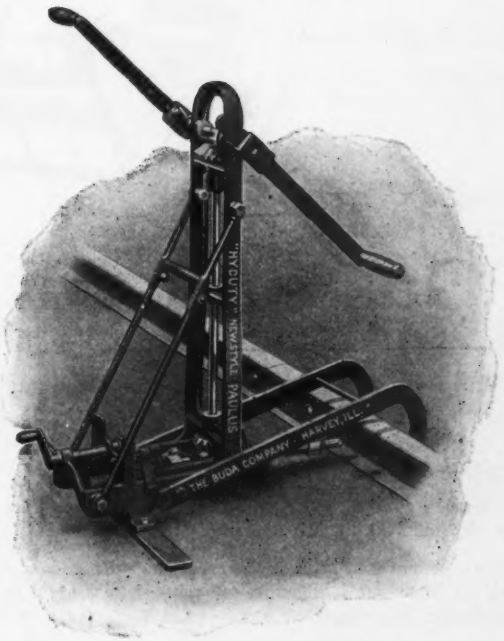

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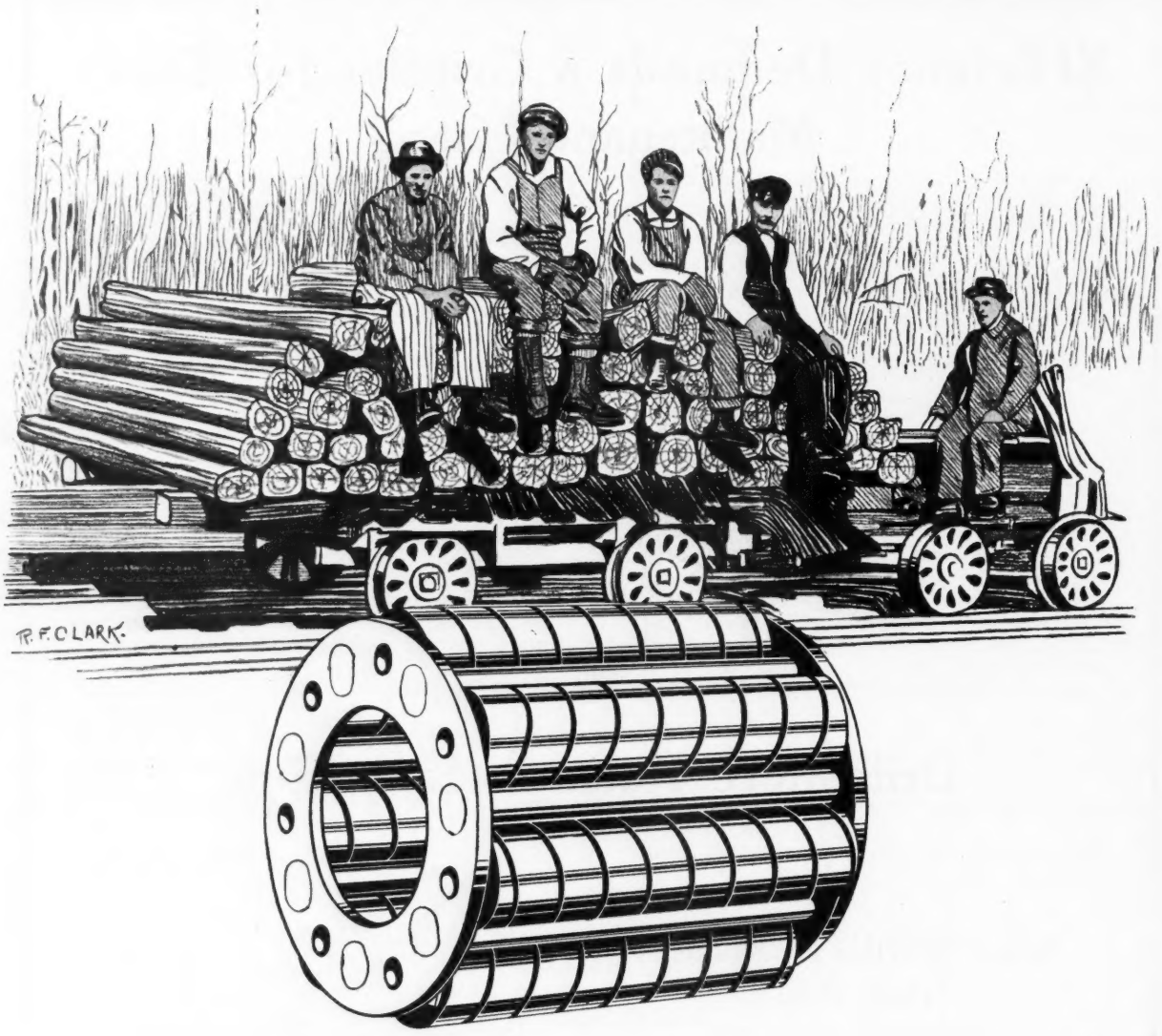


Gas and Oil are "'way up"

THAT explains the cause of expensive motor car operation.

It means that power is a very expensive proposition.

Then why waste it in overcoming the friction due to the old fashioned plain bearings?

Do you realize that you could reduce your gas and oil bill at least 30% if your car was equipped with Hyatt Roller Bearings?

Stop this waste of money!

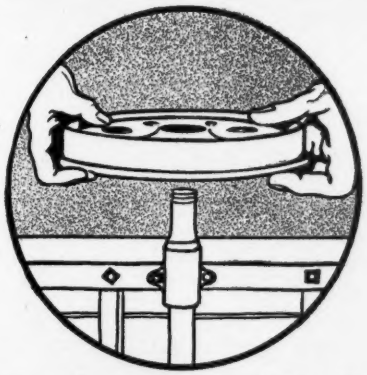
Convert your present cars into Hyatt Roller Bearing cars—money-saving cars.

Equip them with the Hyatt Roller Bearing Replacement Box—the box that is easy to get—and easy to install.

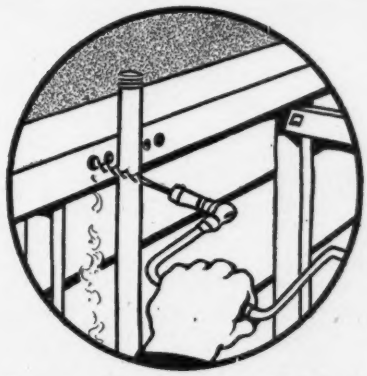
Here's how to go about it.

Look at the bottom of the next page.

HYATT BEARINGS



First take off the wheels and the old-fashioned plain bearing boxes.



Next you drill two new bolt holes in the car sill.

Then put Hyatt Bearing Replacement Box in position and bolt in place.

SELECT the manufacturer who can supply you with the boxes you require.

Drop him a line. Complete information including some surprisingly low prices will be sent to you at once.

When you get the boxes the first thing to do is to take off the old fashioned plain bearing box.

Drill the new bolt holes.

Place the Hyatt Replacement box in position and tighten the bolts.

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Could anything be simpler than that?

Fill up the boxes with grease and they will require no further attention for at least three months.

Keep your eye on the gas and oil bill.

Watch it dwindle down.

That's how Hyatt Roller Bearings pay for themselves in a few weeks.

That's why the most prominent railroads in this country and in South America are specifying Hyatt Roller Bearings on all of their new equipment.

And now a word about your pump and push cars.

Hyatt Bearings work wonders on pump and push cars.

They make them go up and down the track as if the wind was in back of you all the time.

They take the back-aches, puffing and sweating out of your work.

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Just give Hyatt Bearings a trial.

Find out what it means to have dependable, efficient and economical service cars.

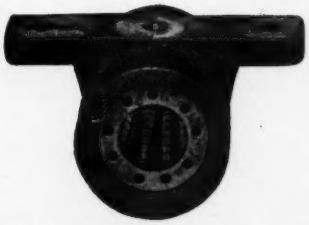
You will never want to go back to plain bearing equipment.

Get your Replacement Boxes and Bearings NOW.

And the next time you are in the market for new equipment, be sure to say "Equipped with Hyatt Roller Bearings."

Hyatt Roller Bearing Company

NEWARK, NEW JERSEY



Replacement box equipped with Hyatt Roller Bearing ready for installation on motor car.

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Boxes for all Fairmont cars—and all other makes of hand and push cars

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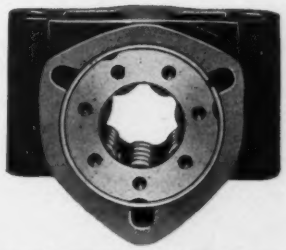
Boxes for extra gangcars only



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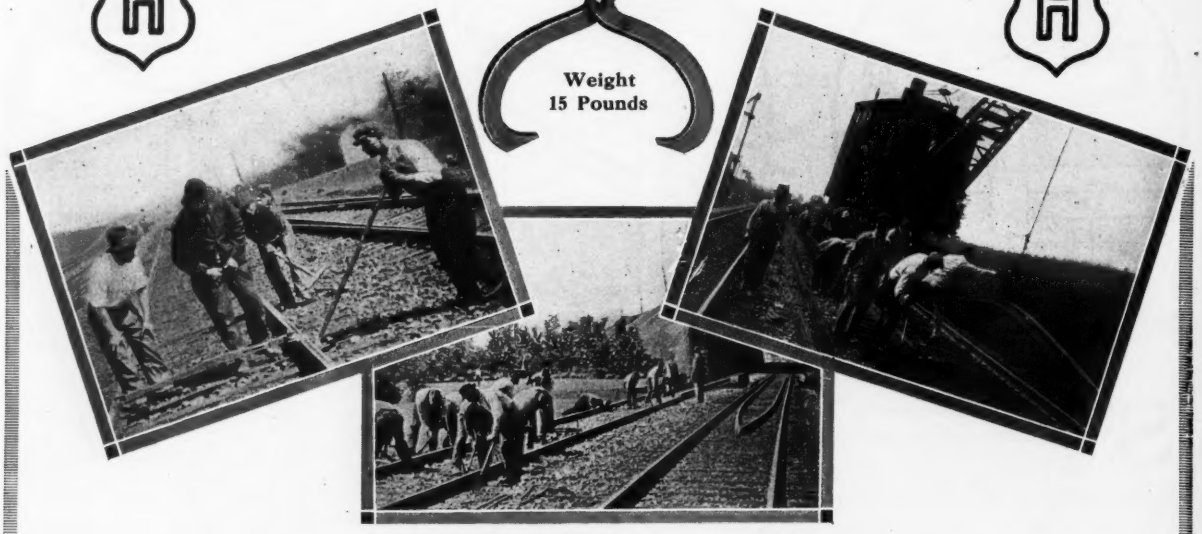
Tie Tongs

Weight
15 Pounds



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Railway Maintenance Engineer

Volume 13 August, 1917 Number 8

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age Gazette* and *Railway Engineering and Maintenance of Way.*)

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Watch the Water Service

The present heavy traffic, which is taxing the facilities of the railroads severely, is requiring the service of every available locomotive. It is, therefore, necessary that those agencies tending to limit the service of the motive power should be reduced to the minimum. One of the most common causes of engine failures and allied troubles is poor water. The water service department can do much to assist the operating officers in handling the traffic by seeing that the water provided for locomotive use is of the highest practicable quality. In some instances this will demand the installation of treating plants involving the expenditure of a considerable amount of money, but in many instances the character of the water can be improved materially by adopting simple precautions with which the experienced water service man is familiar. Present conditions demand continued close attention to the water supply and those in charge of this branch of the maintenance of way department can contribute materially to the operating efficiency of their roads by being constantly on the alert.

Completing Construction Work

It is the common experience of most roads that the transference of a section of track or similar work from the construction to the maintenance forces is followed almost immediately by complaints from the latter regarding the numerous details left unfinished. As described on another page, the Boston & Albany overcomes this difficulty by requiring the construction department to complete all work to the satisfaction of the division engineer in charge of maintenance of way matters and to secure his written acceptance of the work before being relieved of responsibility for it. In this way the completion of the work is insured and the cause for much friction eliminated. It may be impracticable for construction forces to be retained on a piece of work a sufficient time to permit all details to be completed, but intelligent administration of this plan will recognize this fact. In most cases, it is true that construction work is left unnecessarily incomplete, requiring the transfer to the work of maintenance of way forces and the loading down of the maintenance of way accounts with expenses which do not legitimately belong to them.

Protecting Surplus Material

Some of the railways have already ordered rails for delivery in 1919 at a price of $40 per ton, or $10 more than two years ago. Spikes are now costing $90 per ton as compared with $30 in 1915, and bolts have increased from $36.40 to $110 per ton in this period. These facts are typical of conditions in the steel market and indicate the necessity of conserving all materials to secure the full service from them and to eliminate unnecessary loss of all kinds. The foremen are the employees of a railway upon whom the responsibility for co-operation of this character rests ultimately in large measure. They can do much to extend the life of materials by giving them proper attention while in service and by taking special precautions to see that they are not subjected to unnecessary abuse. Also, it is usually necessary for each foreman to carry a certain amount of reserve material in addition to that held in the division general storerooms. This stock

should not only be protected against loss by theft, but should also be kept under shelter if of a character which deteriorates from exposure to the weather. Even though the one-half keg of bolts which a foreman may have on hand is relatively insignificant in itself, it becomes an important item when multiplied over the system, and the loss from rusted materials of this sort may be considerable. The interest of the company can be fully conserved only when each man does his part to eliminate unnecessary losses.

ECONOMICS OF TRACK LABOR

AN English contemporary calls attention to the advantage of "motor-operated trolleys for platelayers," which, translated into "American," means motor cars for track men. The European war has awakened England to the need of labor-saving devices which until recently were frowned upon by capital and bitterly opposed in many cases by labor. This view is changing, and as in the case cited, the English journal calls attention to the fact that "men's time may then (after the war) be so much more costly that it will be economical to convey them to the job." It also notes that section motor cars are being used in India, Australia and South America as well as in the United States.

This expresses a point of view that must be taken if the track labor problem is to be solved. Railway officers in the past have been accustomed to think of track work in terms of three, four or five men per section, multiplied by the wage per man, which was in most cases placed at the smallest figure that would keep the men on the job. It is true that a certain number of men must be held in readiness for emergencies, but with this exception the real basis for track work is the actual amount of work that must be done to keep the track at a certain standard of physical condition. The problem, then, is to do this work with the least amount of money, and this is not necessarily accomplished by paying a rate of wage so low that it will attract only the most inferior grade of laborers.

Having employed the man, it is essential that he be kept employed profitably and effectively during the hours of work and, as pointed out above, it is not in America alone that the effectiveness of labor-saving devices is coming to be appreciated. In this country at the present time the question is not how to get the work done cheaply, but how to get it done at all. The impetus which the present difficulties will give to the introduction of labor-saving devices as a matter of dire necessity will unquestionably lead to the permanent adoption of these devices for purely economic reasons after the war when the labor shortage will have been overcome, at least to an important degree.

ANOTHER ANGLE OF THE BONUS SYSTEM

IN their efforts to devise means by which the men secured for service in the maintenance department of the railroads may be induced to remain on the job, railway officials have tried out many plans during the last few seasons. During 1916, laborers from the south and from Mexico were brought north in large numbers, at the expense of the railroads. This method of securing labor had several variations and, with few exceptions, only those roads that held out inducements in the shape of a bonus for a certain term of service, received anywhere near satisfactory results from the experiment. Without the incentive of the bonus, the men soon availed themselves of the higher wages paid by the munitions factories and industrial plants, making it necessary to bring still other men to fill the vacancies. This resulted virtually in a continued procession of men to the north and northeast. This inclination to make capital of the roads' necessity—to secure free transportation from the south where wages were low, to the industrial centers of the north and east—was overcome in a measure by several roads through the offering of a bonus in the shape of free transportation back home, payable at the end of a six months' service. By this means a small proportion of the men were induced to stay with the road for the specified time, but almost invariably at the expiration of the six months they applied for their bonus and a discharge.

Believing that the bonus system was the only effectual means of meeting the situation, a new plan was inaugurated on one important eastern road this season, whereby the men are paid a progressive wage. Starting at a fixed rate, which varies with the location and the conditions, the wages of men remaining in service for a month are raised two cents an hour. Similar raises are given for succeeding months until the maximum is reached. The foremen of gangs are also paid a bonus if their men earn theirs, so that the responsibility for holding the men and, so far as it is possible, of hiring them is thus placed, where it belongs, on the foreman, and his recompense is commensurate with his success in coping with the added responsibility. The railroad has made it as easy as possible for the foremen by taking over the commissary department, realizing that the class of men now available are not content with the macaroni and similar foods used largely by the Italians previously employed. A foreman cannot possibly hold his men without good food and comfortable surroundings.

HOLD THE CONVENTIONS

IT is important that every man in the maintenance of way department devotes the maximum amount of time and energy to the upkeep of the property under his supervision during the present period of labor shortage and uncertain delivery of materials. It is even more important that he direct his forces most intelligently in order that the maximum results may be secured from these efforts. It is in the latter respect that the associations with their conventions are of assistance.

Following the entrance of the United States into the European war, there was a movement immediately to postpone all conventions, on the ground that the members could not be spared from their regular duties. However, in several branches of railway service, and particularly in the maintenance of way department, the past year has brought new and serious problems. The labor situation has become more tense, while many materials essential to the upkeep of the tracks and structures are almost impossible to secure. These conditions make necessary the revision of old practices and the adoption of new methods. For this reason the exchange of information between men on different roads and located in widely separated parts of the country, is particularly desirable this year, and the value received from discussions of the problems now confronting the maintenance of way department will far more than outweigh the temporary loss of time from the work.

To meet the demand for information of this character it will be necessary that the convention programs be prepared and the subjects selected for report and discussion which will be of the greatest help to the members. In most instances, this will require a radical revision in the subjects which were selected for consideration last year. Even at the risk of abandoning a considerable amount of work already done in the preparation of re-

ports on certain subjects of a routine nature and without special application to existing conditions, the officers in charge of the associations owe it to their members to make the conventions this year intensely practical in character, for if the time is to be taken with the discussion of purely routine problems there is much merit to the suggestions that the conventions be abandoned entirely.

The executive committee of the Roadmasters' Association met this issue squarely a couple of weeks ago by preparing an entirely new program for its convention which will be held in Chicago in September. Subjects which could be considered with value at any time, but which were not of special timeliness at present, were replaced by papers on various phases of the labor problem and of the material situation with direct application to track work. This action might well serve as a precedent for the other maintenance of way associations.

BETTER HOUSING ACCOMODATIONS

AS a large employer of transitory labor, a railway bears a responsibility to these men to provide them with proper living accommodations. As a tax payer and a property owner in the communities along its lines it is also responsible to the citizens of these communities in the prevention of nuisances on its property. In years past the roads have not measured up to their full responsibility to their men, and as a result maintenance of way work has not been regarded with favor by the better class of men and has been accepted only as a last resort by those unfit for employment elsewhere. The roads have also failed to realize their full responsibility as citizens and as a result have brought into existence regulations governing the conduct of their camps by public health commissions. In the one case they have lost their men, and in the other the good-will of many of the citizens along their lines.

Although prompted primarily by the need for men and to a lesser extent by the requirements of public bodies, the roads are now making a big improvement in the condition of their camps. More attention is being paid to this subject this year than at any previous time. It is unfortunate that most of this work has been done under compulsion of one kind or another, for it can be justified fully on the ground of economy. Good camp accommodations pay handsome returns in times of surplus labor as well as when it is scarce. Men are attracted by comfortable living conditions and the road which offers these facilities possesses an important advantage over its competitors in times of adequate labor supply, which is reflected in its ability to exercise more of a selection in the employment of its forces, while in times of scarcity it is able to secure a larger proportion of the available supply. Furthermore, good food and a good night's rest fit a man for a day's work, while lack of these tend towards inefficiency, regardless of the character of the man. No man who is ill fed, sickly or worn out can do a full days's work, and since there is no practical way of differentiating in the wage rate, the railway must bear the loss.

The more advanced industrial concerns are realizing more and more that so-called welfare work among their employees, which tends to improve their physical condition and fit them for their work, is a good investment, measured in terms of the output of work performed by these men. When the railways universally realize that clean, well-ventilated camps, maintained in a sanitary condition and free from vermin, with an ample supply of good water and located in healthful surroundings, pay in terms of the output of work performed by these men, they will give more attention to the subject. If the present shortage of labor does no more than create a realization of the fact that labor responds to good treatment, the present scarcity will have been worth while, for the improved conditions will yield returns to the roads for years to come.

HOLDING CARPENTERS

THE labor problem with respect to bridge carpenters presents a somewhat different aspect than that prevailing with other classes of maintenance employees. While the wage rate for carpenters has usually been less than the prevailing rate for men doing similar work for other concerns, the railroads have usually attracted a sufficient number of men to supply their needs. Railway carpenter work is ordinarily not conducted with the drive of contract work; there is less loss of time on account of the weather, strikes or other contingencies and the free transportation is an item that appeals to many. Moreover, the work has an appeal that holds so many in most classes of railroad employment. For these reasons bridge carpenters attracted to other lines by higher pay frequently drift back into railroad work.

Living conditions for the bridge and building crews are largely within their own control. If furnished with good cars the environment is really what they make it themselves, and as the board is commonly conducted on a co-operative basis, it is exactly what they agree upon among themselves. Except as the railroad can arrange to supply the men with more commodious and better-maintained cars, there is little demand for improvement in the living conditions.

Owing to the abnormal industrial conditions existing during the last year, many of the railroads have suffered serious inroads in their bridge and building forces. Men who have built up service records of many years' duration are finding themselves unable to resist the opportunity to secure larger wages elsewhere. The construction of the army cantonments, which involves an enormous amount of carpenter work of a plain character, can be mentioned as a most important factor in this labor market at the present time. The railroads, under the circumstances, are being seriously embarrassed. For instance, one road is losing its men in spite of the fact that it raised their wages twice since the first of the year, the second time meeting the demand of a committee of a maintenance of way employees' organization. The road has also been lenient in regard to passes and trips home over Sunday, allowing them part time for travel on Saturday and Monday. Obviously there is nothing about the working or living conditions that can be held responsible. Apparently the only solution implies a choice of raising the wage rate or of reducing the amount of work. Resort to contract work in a larger measure is suggested as one way out, but as most of the larger building work is now done by contractors and repair work does not lend itself readily to contracting, the extension of these methods is restricted largely to the construction of the smaller buildings. This offers a number of obstacles, chief among which is the fact that this work will usually attract high grade firms.

It is not to be expected that any specific cure will be found that will overcome these difficulties in every case. Instead a thorough study must be made of the entire situation, including an investigation of the actual conditions under which the men are employed, and it is possible that some unsatisfactory situation may be unearthed, the correction of which will prevent more men from leaving. In other cases a raise in the rate may be cheaper than the hiring of inferior substitutes for the men who leave because they can get more pay elsewhere.

LETTERS TO THE EDITOR

THE WOLVES ARE HERE

DANVILLE, ILL.

TO THE EDITOR:

If we can get good reports and free and open discussion on the subjects to be considered at the Roadmasters' convention next September, I feel quite sure the convention this year will be worth while. The roadmasters have been crying wolf over the labor supply and labor-saving devices so long that our people have been taking it for granted that we would keep yelping and that nothing much would happen. However, it surely has happened now, and they will have an eye on us this year to see if we really know anything about wolves after all.

JAMES SWEENEY,
Supervisor, Chicago & Eastern Illinois.

THE IDEAL FOREMAN

LORAIN, OHIO.

TO THE EDITOR:

The track foreman has become a recognized craftsman. He must possess five requisites of character—honesty, reliability, enthusiasm, competency and obedience. It is difficult to choose which is more important, as all are essential. A great deal of responsibility rests on his shoulders, as he is responsible in many ways for the safety of property, the traveling public and other employes of his company.

His first duty is to satisfy himself that his track is safe. If not, he should make it so, or take the necessary precautions to avoid an accident. Should necessity require him to protect his section during a storm or to perform other emergency services outside of working hours, he should do so unhesitatingly and willingly.

The foreman is usually judged by his ability to put in a switch. In reality, there are many other factors to be taken in consideration in track work which are just as important. A foreman must possess a certain amount of knowledge, but he must have sufficient judgment to apply his knowledge wisely. He should have a fair education. He must be able to read readily and understand instructions sent him, work common problems in arithmetic and express his thoughts clearly and concisely in his correspondence.

Attendance at meetings is of vital importance. Here the foreman can have his problems discussed and hear comments which will assist him greatly in his work. The intelligent foreman will avail himself of any reading matter pertaining to track work and take advantage of every opportunity that is offered him to increase his knowledge of his craft. He should be on the alert to learn, and devise labor-saving methods. Work slowly done is not necessarily well done. Expedition is an adjunct to excellence, as no man can do work rapidly without giving it his full attention.

Should the foreman engage in labor with the men? This is a difficult question to answer. The foreman in a large gang needs his entire time to direct the work. In small gangs he should engage in labor with his men, or at least spend his time to some good advantage in addition to supervising the work of the men. In this it is assumed that more than eight men constitute a large gang and less than six a small one. The average foreman, if he cares anything at all for his environment, unvaryingly chooses good characters for his associates, and desires tidy surroundings about his home, and the place of his employment.

Patience in teaching men their duties and habitual fair treatment will make an enviable reputation for any foreman. He will then receive prompt and efficient service from his men and it will help to hold them. There are many ill-mannered foremen who are under the impression that a section man must be given a certain amount of instruction every day regardless of how much he knows or how long he has been in the service. Instructions given in an ill-mannered way and followed by a volley of abusive and profane language soon demoralize the men and they lose respect for the foreman and themselves. Conduct of this nature is intolerable and the sooner a successor of good moral character can be obtained the better.

A foreman should never come to his section in a sullen frame of mind. He cannot do his work properly when his mind is disturbed and if he has difficulty in overcoming his moroseness he should stay at home or away from his gang until he is able to direct work in a more happy manner.

DAN DEPALMO,
Track Foreman, B. & O.

A FOREMAN'S OPPORTUNITY

LAS TANOS, N. M.

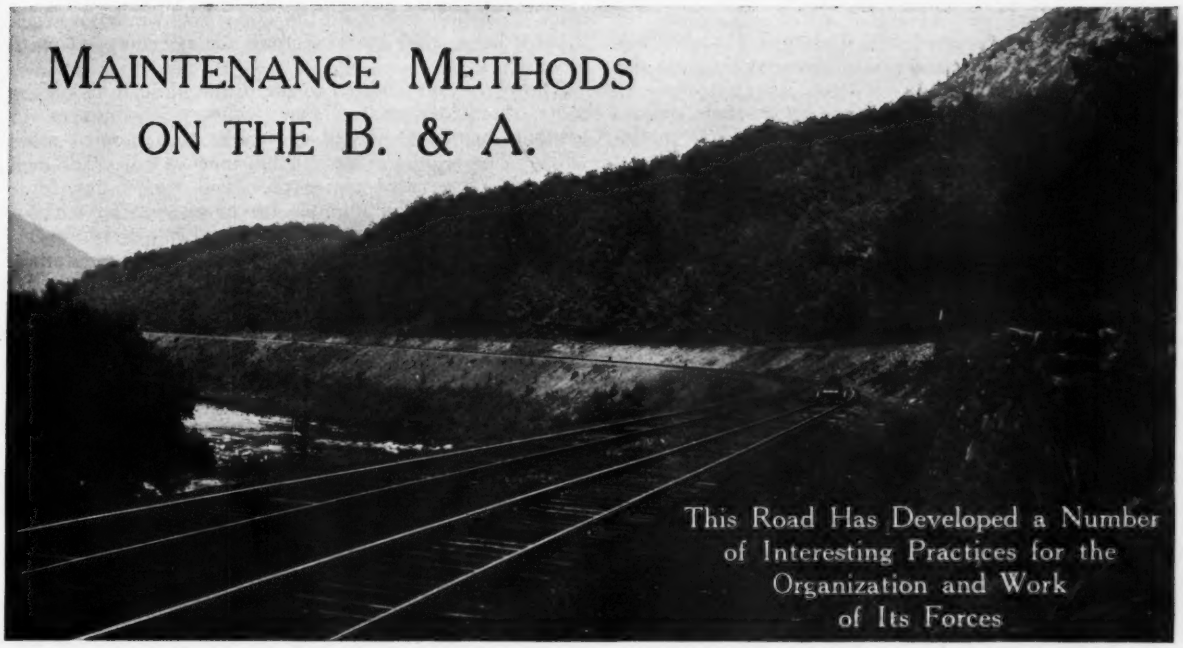
TO THE EDITOR:

Track work is now far different from what it was 15 or 20 years ago, therefore there is plenty of room for a foreman to exercise good judgment in distributing the money allowed by the company regardless of how small the allowance is. If he is of practical skill he will be able to plan the maintenance of his track according to his allowance and get along fairly well. A good foreman will realize that his roadmaster and resident engineer at times do not get what they consider desirable or even necessary. Therefore, it is up to a foreman to work with his superiors in the distribution of the money and material allowed to the best advantage possible. It is quite surprising to see how well a roadmaster, engineer and track foreman can get along if this plan is followed closely.

The business of a railway is to carry traffic and the methods of operation will be governed by the requirements of that business. Therefore it is useless for the maintenance of way department to complain about the effects of increased loads and high speed upon their track. Rather the track must be made to fit the traffic conditions. With this understanding it is essential that a foreman exercise good judgment in his work, especially when he has a small gang. He should never surface any more track than absolutely necessary. A section foreman is a maintainer and he has no time to disturb his track unnecessarily by trying to do extra gang surfacing and alining. He should never trust his eyesight in maintaining surface, but should walk over his section with his level board detecting low spots and surfacing just enough to keep his track level. It should be recognized that the poorer the condition of the track is in relation to the traffic the greater the expense for maintenance and renewals, as the track deteriorates because of the weight and shock to which it is subjected. If the track is maintained to surface the gage and line will not give any particular difficulty. On the other hand, if at any time any of these three items is absent, there will be no end of trouble for the foreman and he is sure to hear from the roadmaster.

HENRY KOCH,
Section Foreman, E. P. & S. W.

MAINTENANCE METHODS ON THE B. & A.



This Road Has Developed a Number of Interesting Practices for the Organization and Work of Its Forces

On the Main Line in the Berkshires

THE Boston & Albany is a highly developed road which handles a very dense, high speed traffic and is maintained to unusually high standards. Although leased to and forming a component part of the New York Central System, and although it comprises only 394 miles of line, almost all of which is in the state of Massachusetts, it is operated separately with a complete maintenance of way organization of its own. Because of the close supervision and attention to details which this organization permits, a number of practical methods have been developed which are of general interest to maintenance of way men.

Physical and Traffic Conditions

The main line of the Boston & Albany extends from Boston, Mass., west through Worcester and Springfield to Albany, N. Y., a distance of 200 miles. Branches also extend from the main line to Milford, Webster, Winchendon, Athol and North Adams, Mass., and to Hudson, N. Y., giving a total line mileage of 394 miles. Connection is made with the main line of the New York Central at Albany, affording a New England outlet for this system. The main line between Albany and Boston is double track for the entire distance, with 84 miles of third track and 25 miles of fourth track. The road includes a total of 1,129 miles of track of all kinds, 407 miles or 37 per cent of which consist of yard and side tracks.

East of Springfield the maximum grade is 60 ft. to the mile, while west of that point it is 91 ft. to the mile in the Berkshire mountains, the summit of which is crossed at Washington, Mass., at an elevation of 1,452 ft. Approximately 100 miles of the main line is on an ascending grade westbound, with a total rise of 2,797 ft. and 90 miles eastbound, with a total climb of 2,786 ft. Owing to the roughness of a large part of the country through which the lines pass, both the main and branch lines have relatively heavy curvature, approximately 50 per cent of the entire mileage being on curves. The sharpest curve on the main line is 6 deg.

The traffic on the main line consists of frequent high speed passenger service and a dense time and dead freight movement, while that on the branch lines is primarily local business incident to the serving of small New England manufacturing communities. During the year ending December 31, 1916, the Boston & Albany carried 3,879,129 tons of revenue freight one mile per mile of line, or approximately three times the traffic of the average road of the country. During the same period this road also carried 924,032 passengers one mile per mile of road, or over seven times the average passenger traffic of the country. The total operating revenues were $55,020.79 per mile of line, or almost four times those of the average road of the United States. These figures include main and branch line traffic. Obviously the business handled on the main line is much heavier than on the branches, averaging about 85 trains daily last year.

During 1916, $1,916,548.12 was spent for the maintenance of way and structures, or $4,872 per mile of line. Approximately 75 per cent of this was for purely maintenance work and the remainder for the operating charges for addition and betterment work.

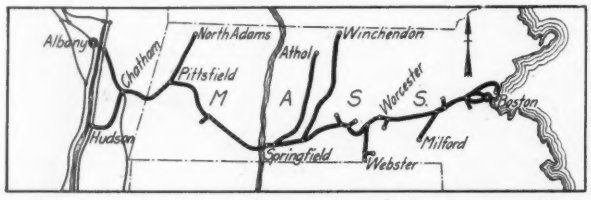
A Departmental Organization.

In common with the other lines of the New York Central System, the organization of the Boston & Albany is strictly departmental in character. The maintenance of way department is under the direction of the chief engineer, who reports to the vice-president. Assisting him are a designing engineer, in charge of new work involving other than bridges, and an engineer of structures, having charge of the design and construction of bridges. A division engineer is in charge of maintenance work on each of the two divisions, reporting solely to the chief engineer.

Each division engineer has a small engineering corps which does all the routine engineering work on the division. He has also two track and one bridge and building supervisors, the latter also handling water service and plumbing work. Each supervisor in turn has an assistant. These supervisors are technically trained men, recruited from the engineering corps, while in most cases

their assistants are men without this training and are recruited from gang foremen. A landscape gardener has charge of all shrubbery and lawns about stations on the two divisions.

A signal supervisor is located on each division, reporting to the signal engineer, who in turn reports to the general superintendent on maintenance and operating matters and to the chief engineer on new construction and all other work involving special expenditures. The signal forces install all trunking and bonding, while the track men have charge of the installation and maintenance of



MAP OF THE BOSTON & ALBANY LINES

all insulated joints and switches and are solely responsible for the condition of switches.

All construction work is handled under the direction of resident engineers working out from the chief engineer's office, independent of the division engineers. Such work remains under their charge until the division engineer inspects and indicates his acceptance of it on a standard form provided for this purpose. After accepting the work the division engineer and his maintenance forces are responsible for it. The requirement that maintenance forces accept work in this way has been found to aid materially in securing the full completion of the work before it is turned over for operation.

In general, grading work, except of a minor nature, is contracted. During the last two years some track work incident to yard extensions has also been contracted because of the scarcity of men, although in general such work is done by company forces.

Section foremen are given two weeks' vacation each year with pay, if it is possible to arrange for it. These men and all permanent trackmen are also granted holidays with full pay on Memorial Day, July 4, Labor Day, Thanksgiving and Christmas, while time and one-half is allowed for overtime and Sunday work, with a minimum of three hours allowed for every call after the men have been relieved from duty. Each foreman and permanent trackman is also allowed 200 old ties for fuel each year and they are ordinarily delivered along the tracks near his home by work trains at some convenient time. Most of the foremen are of Irish descent, although a few Italians and a few French foremen are also employed. Most of the trackmen are Italian, although a considerable number of native men are employed, particularly on the lines west of Pittsfield.

Each foreman in charge of a yard section is given an assistant foreman. Outside of the yards each foreman on the main line is allowed an apprentice, who receives ten cents per day more than the trackman, and who is considered to be in training for the position of foreman. Each section foreman is permitted to select his apprentice, the men being drawn from the gangs in most instances. If they do not show prospects of developing into foremen they are set back in the gangs and other men selected. The foremen have an incentive to train these men, as the granting of permission to them to take their vacations depends largely on their ability to train men in their gangs to relieve them. The sections average about four and one-half miles long on the double track main line and about ten miles long on single track branch lines, the latter sections being equipped with motor cars.

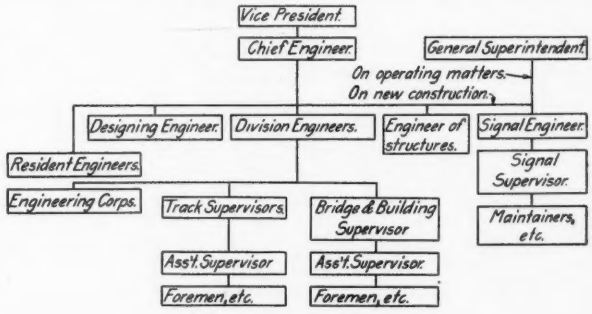
The forces are allotted to the different sections on the basis of equated mileage, two miles of sidings or 15 turnouts being considered equivalent to a mile of main track. The regular summer allowance averages 0.88 men per mile of equated main track and the winter force half that size. The summer forces are put on without special authority on April 1 and are taken off on November 1, special instructions being issued if this program is to be departed from in any way. The allotment of men on the individual sections is varied somewhat, according to local conditions, although in most instances no deviation is made for track walkers, as no men are employed in this capacity permanently and their number is limited to a few particularly bad points in the spring and fall.

Each track supervisor has a work train assigned to his service the year round for general work and secures others on the authority of the chief engineer for special work as required. Each subdivision is also allowed one permanent floating gang throughout the year. In most cases these gangs are employed with the work trains. In general all ballasting and rail renewal work is done with the floating gang rather than with section forces.

Each division engineer holds frequent meetings with his supervisors to discuss the work in hand and the distribution of forces. In the same way the supervisors hold frequent meetings with their foremen. The department or the divisions are not given monthly allowances for their work, but it is handled on season and job appropriations.

TRACK STANDARDS.

The standards for track materials are in a large measure those common on the New York Central System. The 105-lb. Dudley section of rail is used on the main line with a six-bolt, three-tie supported joint. Until recently only the curves were tie plated, but it is now the practice to apply plates on all ties as new rail is laid. A canted tie plate with an inclination of one-eighth inch in five inches has been used for the last three years with

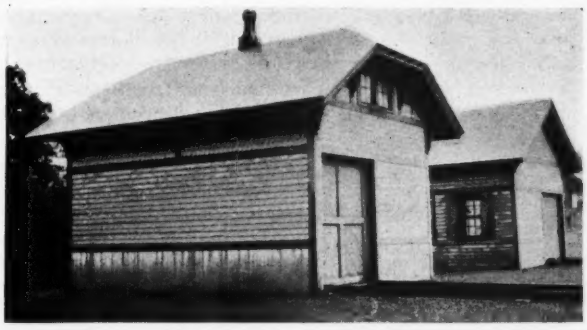


ORGANIZATION CHART

excellent results, effecting a very great reduction in the labor required to cant rails back.

Untreated ties are used almost exclusively, the only treated ties in service being a lot of about 20,000 which were installed several years ago. Southern yellow pine ties 7 in. by 9 in. by 8 ft. 6 in. are brought into Boston by water for the main line, while chestnut ties, cut locally, are used to a large extent in branch and side tracks. The ties are distributed along the line during the winter by the extra gangs and work trains. As far as possible all ties are distributed by April 1 and are in the track by the middle of July, giving the section forces the remaining summer months to get their track into shape for the winter.

The section foremen are held responsible for the intelligent renewal of ties. Before taking them out the foremen mark the ties which they think should be removed and the track supervisor or his assistant looks them over. These men also examine the ties after they are taken out to check any tendency towards extravagance. As a further means of encouraging the foremen to conserve their ties a comparative statement of the cost of the ties used on each section is prepared and copies are furnished each foreman. On the Albany division an attempt has been made to compile records showing the life of all ties,



STANDARD TOOL HOUSE

but on the Boston division this system was abandoned four years ago and an attempt is now being made to secure data regarding the service life of ties from information collected on special test sections.

Stone ballast is employed almost exclusively on the main line and about 60 per cent of these tracks are now so equipped. Where stone is being applied for the first time it is the practice to place it on 12 in. to 15 in. of cinders. It is also the practice to widen the embankments and cuts to permit the tracks to be thrown out to 13-ft. centers and to provide a bank 10 ft. from the center line of track to the shoulder at the same time, cinders being used for this bank-widening work.

Cinders are used almost exclusively for ballast on the branch lines. They are also spread on the slopes in deep cuts and high fills, where they keep down weeds and eliminate the tendency of the earth to slide. Thousands of dollars have been saved by their use. The demand for these cinders has been so great that none has been wasted for the last six years, but they are all hauled out on the line in cars reserved for this purpose, the cars being equipped with side doors and hopper bottoms. One hundred Hart convertible cars are also assigned to this service. The cinders have been particularly successful in eliminating the heaving of tracks during the winter, the shimming being reduced 75 per cent on the Ware river branch, following the ballasting of the tracks with this material. The thorough ballasting of the main line has practically eliminated shimming on those tracks, while slow orders, because of track conditions, have also been almost entirely eliminated.

All sidings are protected with derails connected with the main line switches. Previous to three years ago bumping posts were used at the ends of many stub tracks, but these have since been removed and in their place the rails are now spread 30 ft. from the end so that cars drop through onto the ties. The rails are also turned away from the main track where conditions permit. Sand to a depth of 6 in. over the top of the rail is added. This form of construction has been found to reduce the number of accidents and the damage to equipment materially.

Manganese construction is standard for all rigid frogs, spring frogs being made of open-hearth steel. Manganese tips are also employed on switch points in all locations of severe wear, while one-piece guard rails of the same material are standard on both divisions. Manganese construction is also used largely for crossings.

METHODS OF WORK.

The heavy traffic and curvature, particularly on the western division, require the frequent renewal of rail in the main line. It is the practice to relay the rail continuously on curves and tangents when it becomes curve-worn rather than to replace the outside rail on the curves or to relay the curves only. The rail that is fit for further service is then transferred to branch lines and side tracks. Coincident with the renewal of the rail on the main line the ballast is cleaned thoroughly and the ties are respaced. In a similar way each main track is raised out of face every three or four years.

Because of the dense traffic, rail in the main line is usually relaid on Sundays. The track is taken out of service, a large force of floating gang and section men is assembled and four or five miles of track is relaid in a day. During the week previous to the day on which the work is to be done the new rail is loaded on the cars, taken out on the line and distributed. On the same day, or at least within one week, the rail released is picked up. When laying the rail it is set up on the edges of the ties, the joints applied with two bolts and the expansion shims set in place. The old rail is usually thrown out, the new rail thrown in and the ties respaced by extra gangs, while the surfacing and lining is done with section forces.

With the departmental organization in effect on this road, the general stores department handles no maintenance of way supplies, but each division engineer has a storekeeper reporting to him with a storehouse on the division. This man is in charge of all supplies for the department and carries at the division storehouse the

CINDERS ON A SLIDING BANK

stock required for all maintenance forces on that territory. Until recently each supervisor had a separate supply store on his subdivision, but this practice has been superseded by the central division storehouse and only small amounts of materials for emergency use are now distributed at these points. All accounting for supplies is done by the division storekeepers at their headquarters.

When a foreman needs any material he makes a request on the supervisor, who in turn makes a requisition on the storekeeper, sending a copy to the division engineer. Unless instructed promptly to the contrary by the division engineer the storekeeper fills the requisition without further approval. Supplies are shipped by local freight or by work train ordinarily, although light materials may

be sent by passenger train if desired more quickly. No regular supply trains are operated.

A maintenance of way blacksmith is located on each subdivision, working under the direction of the track supervisor. He repairs all tools and does other simple maintenance of way blacksmith work. The storekeeper at the division headquarters keeps a book record of all tools issued to each foreman to check waste and irregularities. Foremen are also required to turn in worn tools when securing new ones, except with shovels and a few similar items. All scrap is sent to West Springfield, where it is sorted and reclaimed by the mechanical department. All materials found usable or repaired at this plant are returned to the maintenance of way department for further service.

THE ADVANCE SIGN

STRUCTURES

The structures are under the care of the supervisors of bridges and buildings on the two divisions. They include 472 bridges, 251 of which are under tracks and have an aggregate length of 17,826 ft., and 221 of which are over tracks with a combined length of 15,837 lineal ft. The desirability of employing heavier engines has led to the reconstruction of the bridges in the main line during the last six years. In this period over 200 bridges have been renewed without interference or delay to traffic. In most cases this has been accomplished by rolling the old structures out and the new ones into place, and the records made on a number of these structures have attracted much attention.

All of the new structures on the main line are designed for E-60 loading. At the present time there are no pile trestles on the main line and there are only four on branch lines. Following the operation of heavy power considerable trouble has recently been experienced with the breaking down of many of the old culverts of rubble construction. It has been necessary to rebuild a considerable number of them, cast iron pipes being substituted in some instances and concrete arches in others.

The engineer of structures has charge of the design and construction of all bridges until they are inspected by the division engineer, who then becomes responsible for their maintenance. Each division engineer has a supervisor and an assistant supervisor of bridges and buildings, who in turn has one bridge inspector. All bridges are classified according to age and condition into groups for quarterly or semi-annual inspection by the inspectors, this list being revised each year. The inspector reports all corrosion on steel members and the supervisor makes the necessary computations to determine stresses. In this way the safety of the structures is not left solely to the judgment of the inspectors, who are not technically trained men. The supervisor of bridges and buildings also makes a personal inspection of all bridges, retaining walls and buildings on his territory annually.

As much concrete and other light construction work is done with company forces under the direction of the division maintenance of way officers as possible, while the larger jobs are done by contract. The steel bridge gangs are employed throughout the year, being engaged in heavy renewal work in the summer and in lighter repairs during the winter. The concrete workers are employed during the summer only.

The supervisors of bridges and buildings also have charge of all building maintenance, including 151 brick, 61 stone, 579 frame and 2 iron frame buildings, of which 356 have complete plumbing. To handle this work carpenters and plumbers are stationed at various points along the line, while other forces are housed in cars and are moved from place to place as needed. These forces also do all painting and maintain all board fences, wire and other fences being cared for by the track department.

Most of the sections, particularly on the branch lines, are equipped with motor cars, which have proven of much assistance, particularly in reducing the damage from fires owing to the ability of the men to get to them more promptly. On many of the branches it has been found possible to lengthen the sections considerably, those on the Athol branch now ranging from 10 to 12 miles in length. All motor cars are sent to the shops at Springfield once each year, where they are overhauled. In addition, a mechanic gives his entire attention to the maintenance of motor car and other gas engines on the line. This man inspects and adjusts all motor cars on the road monthly, making any light repairs needed at that time. He also gives the same attention to gasoline engines at water stations and elsewhere and keeps all crossing gates in repair. Another man has similar charge of all electrical equipment in water stations and elsewhere under the supervision of the maintenance of way department. Before given charge of a motor car a foreman is required to pass an examination on operating rules before an assistant superintendent. This examination includes questions on the book of rules of the maintenance of way, signal and operating departments.

THE SLOW BOARD

The practice of handling rails and other heavy materials by hand has been almost entirely eliminated. The road has in service three Brown rail unloaders in addition to one Browning ditcher, two steam shovels, and one 80,000-lb. Jordan spreader. It is also beginning the use of pneumatic tie tampers to a limited extent.

Starting about five years ago an inspection of every switch on the division is made at intervals of 60 to 90 days, by the division engineer, the supervisor of track, the signal engineer and the signal supervisor. This trip is unannounced, although the foremen are present when inspection is made. The test applied is to place a ⅛-in. shim between the switch rail and the main rail 6 in. back of the point on interlocked switches and a ¼-in. shim on hand-thrown switches. If the switch can be locked with this shim between the rails it must be adjusted. While the first inspection showed only 35 to 40 per cent of the switches passing this test satisfactorily, at-

tention to this subject has raised this figure to over 80 per cent at the present time.

An interesting practice on this road is that of the use of slow boards. Every point at which there are speed restrictions is marked with three slow boards. These signs are placed at points where the speed is limited permanently by ordinances or roadway conditions as well as to indicate temporary conditions. In this way engine men receive warnings of all speed restrictions and they are held closely to account for their observance. The first board is placed 3,000 ft. in advance of the point protected and indicates the maximum speed permissible at that point and also on three or four track sections of the main line, the track referred to. A second or "home" board is placed at the forward end of the track protected, while a "resume speed" sign is placed 50 ft. beyond the departing end of the slow track. All three of these signs are placed at every point at which speed is restricted. Each sign is provided with a regulation signal lamp giving the color indication to approaching engine men. The lamp is mounted directly in front of the sign with a white light in the rear which illuminates the face sufficiently to enable an engineman to read the instructions on it. These and other roadway signs are of metal construction on posts of old rails.

THE END OF THE SLOW TRACK

Particular attention has been given to the investigation and study of derailments. Each derailment is investigated and where possible the responsibility is placed. The supervisor of track is required to fill out in detail a blank for each derailment, giving the cause, the damage to track and signals and the cost of all work incident to the derailment. Copies of this report are sent to the division engineer, the division superintendent and the chief engineer. These reports are summarized and analyzed in the office of the chief engineer annually and provide a basis for recommended changes in track standards and operating methods. To promote uniformity in the classification of these accidents concise descriptions and definitions of the more common forms of accidents have been prepared to govern the supervisors. These definitions were published in the Maintenance of Way Section of the Railway Age Gazette of February 20, 1914. The concentrated study of this subject has enabled a number of the more important causes of derailments to be eliminated and the number of derailments from other sources to be decreased materially.

A report is also made of every accident to an employee of the maintenance of way department and the details are set out in bulletins issued to all foremen. A summarized report is also prepared grouping the accidents and showing the money losses, copies of this report being sent to the division engineers and supervisors.

Starting two years ago, the division engineer on the Boston division began the collection of detailed records of the cost of performing the more common items of track work, such as the renewal of ties, lining and surfacing, ballasting, etc. At the end of each month he prepares a comparative report showing the unit costs of these items by sections. Copies of this report are sent to all foremen so that they can see how the cost of their work compares with that of their neighbors. The collection and dissemination of this data in this way has effected a very material reduction in these unit costs. It is contemplated that this plan will be extended gradually to the point where detailed records will be kept for all expenditures for labor and for materials for each section.

Each fall a budget is prepared showing the materials which will be required for the routine and special work contemplated for the following season. A second budget showing the forces required is prepared late in the winter and sent to the chief engineer before April 1. He in turn submits it to the vice-president for approval, enabling the forces and the materials required for the season's work to be on hand early in April.

LAYING A LADDER TRACK

BY CHARLES L. VAN AUKEN

THE laying of a ladder track is work which an experienced foreman usually dreads because of the difficulty of moving heavy material ahead after the first two or three switches are put in. This is because the angle at which the ladder is laid soon carries it away from the track with which it connects. Teams can sometimes be used to haul the switch ties ahead and lighten the work. A temporary track can also be laid parallel to the location of the ladder, but this is expensive.

Because of these difficulties a method recently used when laying a No. 7 ladder may be of interest. This track was laid on meadow land without any grading. There was a track a short distance away on each side of the location, but neither paralleled the ladder, one coming near the head end of the ladder for a short distance, and the other being located close to the opposite end. By utilizing these tracks, switch ties were unloaded in sets near enough to be carried to their proper locations. The tie line was stretched, and the ties were laid and spaced when carried in, so that very little moving was necessary after the rails were laid. The spacing was done by locating the heel of the frog and the point and heel of the switch by measuring from the stake locating the point of frog, this being the only one set by the engineer.

The rear end of the ladder was close to the material yards where the rails and switch material was piled. In order to connect up with the material yard, four rail lengths of track were laid, connecting with the ladder, this track having only five or six ties to each panel and being spiked only at the joints and centers. The push cars carrying the material were operated on this track.

The pieces of rail to be used in the leads between the toe of frog and the heel of switch were all cut before the distribution of the steel was begun. They were 13 ft. 11 in. and 14 ft. 1 in. long, respectively, and were obtained by cutting a 28-ft. rail 1 inch off center. These pieces together with a 28-ft. rail made the proper length of rail to use between the frog and the switch point.

As the material was stored at the rear of the proposed ladder it was necessary to lay the track opposite to the usual direction. It was found expedient to set up the rail on the line side temporarily when placing the frogs in order to expedite the distribution of material. Each switch point was located two feet behind the heel of the frog ahead, and this necessitated squaring the joints at the heel of each frog. The pieces of rail required to

square up opposite the frogs could not well be cut until the stock rail and one rail behind it on the line side were in place. One of the pieces of rail cut for the curved side of the lead was used opposite each frog when distributing the material. A push car was loaded with a frog, four 28-ft. rails, the two pieces cut for the lead, and a pair of switch points and was moved ahead on the part of the ladder already laid down.

The frog was placed in position, the piece of rail cut for the curved side of the lead was laid on the line side opposite the frog, the 13-ft. 11-in. rail and one 28-ft. rail comprising the straight side of the lead were placed and two 28-ft. rails were laid temporarily on the line side. Then the right-hand switch point (it was a right-hand ladder) and the two stock rails were placed. This brought the track up to the second frog. Angle bars were hung on the gage or frog side and the rails on the line side were laid to gage merely to carry the push cars, two of which were used, one being loaded while the other was being unloaded.

By laying the line side of this ladder with temporary rails, and not attempting to adjust the joints, the whole ladder was set up quickly without having to carry any materials by hand except from the push car directly ahead to the correct location. The rails on the line side required very little moving to get them in position. The rails required to square up at the heel of the frogs were cut (or broken, as no up-to-date foreman "cuts" a rail unless a very short piece is to come off), and placed. The joints were then bolted, the joint ties spaced and the track spiked in full.

The switch plates on the line side only were placed and spiked. The whole track was then put in perfect line, after which the left-hand points and the rails comprising the curved side of the leads were laid, lined, and spiked to gage. The leads were lined by measurements taken at the middle ordinate and at the joints connecting the 28-ft. rail and the short rail used in the lead. After spiking these two points, the rest of the lead was lined by eye. It is very simple to line the curved rails in this way, as it is only necessary to crowd out the center of the short rail and the quarter back of the switch point. It only required a foreman and three men to do this, two men with bars and one with a spike maul. About 10 min. was required to line each lead. Four men followed the lining gang and set the guard rails and switch stands as the wok progressed. The work was done with a small gang—about 25 men—with no assistant foreman.

WOOD PRESERVATION STATISTICS

THE proceedings of the American Wood Preservers' Association for 1917, which have just been issued, contain statistics regarding the quantity of wood treated and the preservatives used in the United States during 1916. These statistics were compiled by the Association in co-operation with the Forest Service of the United States Department of Agriculture.

In 1916 a total of 150,522,982 cu. ft. of wood was treated by 117 treating plants. This is 9,664,019 cu. ft., or 6.9 per cent more than was treated by the 102 plants which reported in 1915. An increase of 383,783, or 2.5 per cent, was recorded in the number of cross-ties treated during 1916, while the quantity of piling treated was more by 3,382,448 lineal ft., or 36.3 per cent. The large increase occurred in the number of poles treated, which amounted to more than twice the number reported during the previous year.

The quantity of preservatives used amounted to 90,404,749 gal. of creosote and refined water-gas-tar, 26,746,577 lb. of zinc chloride, 5,675,095 gal. of paving oil and 582,754 gal. of miscellaneous preservatives. The amount of creosote and refined water-gas-tar was greater in 1916 than in the year previous by 9,545,307 gals., while a decrease of 6,523,027 lb. was recorded in the consumption of zinc chloride.

Approximately 48 per cent of the creosote used was imported as compared with 46 per cent the preceding year and over 60 per cent in all years previous to that date, the cost of the creosote ranging from 7½ to 13½ cents per gal. and that of zinc chloride from 6 to 9½ cents per lb.

The relative quantities of foreign and domestic creosote used in 1916 are shown in the table. The importation for 1916 is greater than for the previous year by 6,148,924 gal., an increase of 16.4 per cent. Of the total amount of foreign oil reported by the plants 41,531,091 gal. were obtained from England, 962,839 from Japan, 741,611 from Canada and 414,390 from Germany.

QUANTITIES OF DOMESTIC AND IMPORTED CREOSOTE USED IN THE UNITED STATES FROM 1909 TO 1916

Year	Total Creosote Used Gallons	Domestic Creosote Gallons	Imported Creosote Gallons	Pct. of Total
1909.....	51,426,212	13,862,171	37,569,041	73
1910.....	63,266,271	18,184,355	45,081,916	71
1911.....	73,027,335	21,510,629	51,516,706	71
1912.....	83,666,490	31,135,195	52,531,295	63
1913.....	108,373,359	41,700,167	66,673,192	62
1914.....	79,334,606	28,026,870	51,307,736	65
1915.....	80,859,442	*43,358,435	37,501,007	46
1916.....	90,404,749	†46,754,818	43,649,931	48

*41,333,890 gallons coal-tar creosote and 2,024,545 gallons water-gas-tar.

†45,318,735 gallons coal-tar creosote and 1,436,083 gallons water-gas-tar.

Since the wood-preserving industry in this country has been built very largely upon the treatment of railroad timber, principally ties, this class of material constitutes the bulk of the wood treated. In 1916 a total of 150,522,982 cu. ft. of material was reported subjected to preservative treatment, of which 112,408,104 cu. ft., or over 75 per cent, was ties. The actual number of ties treated was 37,469,368, an increase of 383,783 over 1915. Of this quantity 26,499,954 were sawed and 10,969,414 hewed. Oak ties lead in the number treated, constituting 44.9 per cent of the total number reported. Yellow pine ties representing 28.1 per cent ranked second, while Douglas fir ties came third with 8.1 per cent.

The number of ties treated with creosote was 20,858,801, and with zinc chloride 14,619,676. The number of ties treated with these two preservatives in the form of an emulsion was 1,978,414, while 12,477 were subjected to treatment with miscellaneous preservatives. In treating ties with creosote and refined water-gas-tar the average impregnation was 8.09 lb. per cu. ft., while for zinc chloride it was 0.50 lb. per cu. ft. Where ties were treated with the emulsion the quantity of preservative forced into the wood averaged 2.75 lb. of creosote and refined water-gas-tar and 0.48 lb. of zinc chloride.

PRESERVATION OF PILES

The quantity of piles treated in 1916 amounted to 12,690,867 lineal ft., or 3,382,448 lineal ft. more than for the previous year. The principal species of wood represented are yellow pine and Douglas fir. Where creosote was used the average injection amounted to 14.36 lb. per cu. ft., and with zinc chloride it was 0.43 lb. per cu. ft. (The injection shown for creosote is an average for piles for both land and water use. The average for the two classes separately would probably be from 7 to 14 lb. per cu. ft. for the former and around 20 lb. for the

latter.) With the use of the zinc-creosote emulsion the average amount of preservatives forced into the wood was 1.958 lb. of creosote and 0.43 lb. of zinc chloride per cu. ft.

The material included under the heading of Construction Timber consists principally of bridge timber, switch-ties and other heavy structural material. The total amount of material of this class which was impregnated with preservatives in 1916 was 138,889,222 board feet, a decrease of 3,119,819 board feet. Yellow pine constituted the major portion of the material treated, except in the Pacific Coast region, where it consisted entirely of Douglas fir. The average quantity of creosote forced into the wood was 11.65 lb. per cu. ft., while for zinc chloride it amounted to 0.45 lb. per cu. ft. Some plants used these two preservatives in combination, and secured an average absorption per cu. ft. of 2.40 lb. of creosote and refined water-gas-tar and 0.498 lb. of zinc chloride.

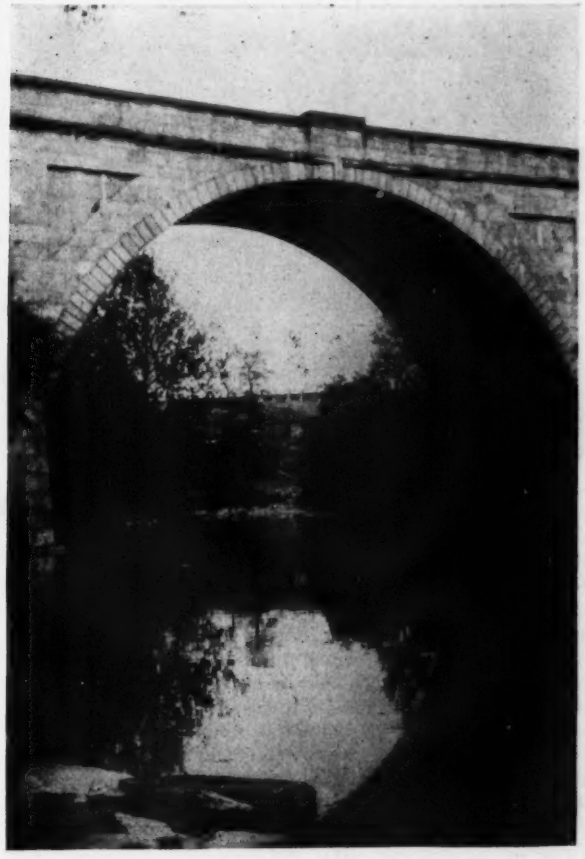
Repairing an Unusual Old Bridge

THE recent necessity of making slight repairs to a stone arch bridge over Gynns' Falls on the Mt. Clare branch of the Baltimore & Ohio, near Baltimore, Md., has brought to light some interesting facts

A Side View of the Structure

regarding what is probably the oldest railway bridge in the United States in service today. This structure is a stone viaduct 297 ft. long with a central arch with an 80-ft. span and with a base of rail 65 ft. 6 in. above the bed of the stream. It was constructed by James Lloyd in 1829, as stated on a marble stone set in the parapet wall, and it has, therefore, been in service for 88 years. It was originally constructed for double track, and, although the equipment it was designed to carry undoubtedly weighed less than the present-day automobile truck, it has remained in perfect condition under the continually increasing loads, until it is now carrying as heavy loads and traffic as any bridge in the country. No repairs would have been necessary at the present time had not the common practice of raising the track at intervals when applying new ballast brought the rails up to the level of the top of the parapet walls and placed a heavy lateral thrust upon them which they were not designed to carry. This has caused the spandrel walls to move to such an extent that it has been necessary to take them down to the elevation of the top of the arch, and in some places still lower, and to reset them, backing them up with concrete under the track a sufficient distance to take the thrust from the parapet walls. In handling this work special care was taken to replace the stones in their former position in order to preserve the originality of the old viaduct as far as possible.

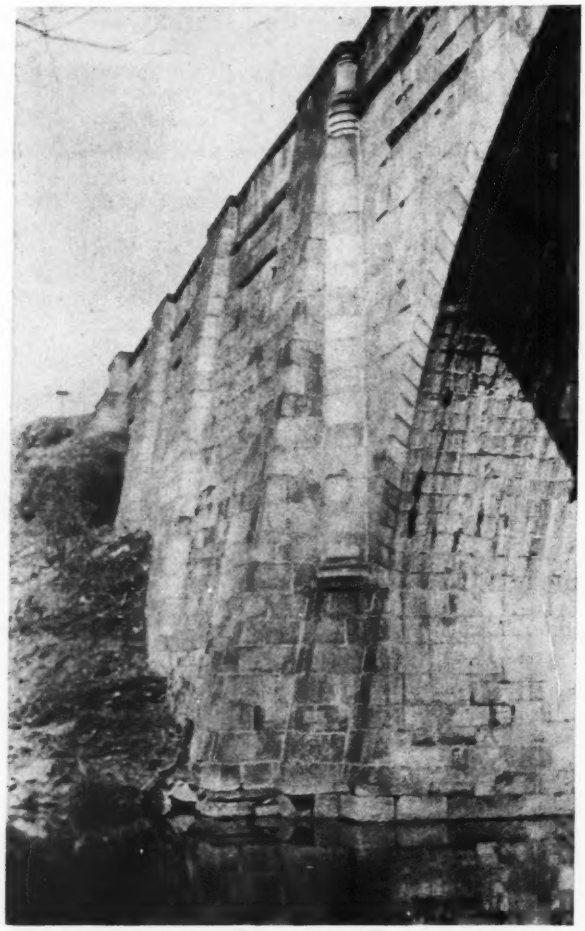
This structure is of native granite cut to a true surface and set in lime mortar. Large pilasters were placed at



One of the Arches

intervals of 25 ft. in the walls. A one-quarter round cut out of granite on a 12-in. radius was placed in each of the re-entrant angles between the pilasters and the faces of the main walls and a large, smooth, recessed panel was placed in the main walls between the pilasters. The

side walls extend to about 4 ft. above the original elevation of the railroad tracks to form parapets. The spandrel spaces over the arches are not filled, but the track load is supported on a system of longitudinal and transverse 12-in. brick walls resting in the arch rings. These walls are spaced 3 ft., center to center transversely, and 5 ft. longitudinally, and are covered with 12-in. granite slabs, which in turn hold the ballast under the tracks.



DETAIL OF THE ABUTMENT

Another historical structure on the same railroad is the stone arch bridge crossing the Patapsco river at Relay, Md., just west of the east end of the Washington branch. This bridge was constructed between 1833 and 1835 and is 612 ft. long and 59 ft. high. It is also constructed of native granite and consists of 8 full arches of 58-ft. span, with brick walls extending above the ring of the arch and carrying the tracks. It has also been necessary to reset the stone in the spandrel walls to protect the parapet walls in this structure. An interesting feature of this bridge is the fact that it is built on a 4-deg. curve.

Both these structures were in serious danger of destruction during the civil war, but by guarding them closely they came through unharmed, and, judging from their present condition, they will continue to serve their purpose indefinitely. We are indebted for this information to S. C. Tanner, master carpenter on the Baltimore division of the Baltimore & Ohio, under whose direction repairs and alterations to these two structures have been made.

HANDLING CREOSOTED MATERIALS AND PILING

The Southern Pacific has prepared and has just issued special instructions relative to the use of creosoted material and also regarding the unloading of piling from cars for insertion in the book of rules of the maintenance of way department. These instructions are usually complete and comprehensive and should be of particular value to bridge gangs in the field.

USE OF CREOSOTED MATERIAL.

Timber is creosoted to protect it from the attacks of fungi, which cause decay, and as there is only a thin protection on the surface, any cutting that exposes the unprotected interior is very injurious to the life of the timber and renders it very little better than untreated material. Therefore all framing must be done before treatment.

The use of peavies, cant hooks, timber dogs, pickaroons, or other pointed tools on creosoted lumber is absolutely prohibited. On creosoted piles they may only be used within one foot of the head or four feet of the point. This refers to all handlings after the timber enters the retort, and this rule must be observed by employees of all departments.

Framing of creosoted piles must be confined to cutting them to height and boring the necessary holes for bolts. The practice of boring holes to support staging planks must be discontinued.

Where the heads of piles are larger than the head of the cap the edge of the pile should be chamfered to shed water.

Creosoted timber must not be framed after treatment, except to correct errors in framing and to bore holes that cannot be located before treatment; and before doing so, foreman must obtain permission from the bridge and building supervisor, who will be held responsible for any unnecessary cutting.

Immediately after cutting piles or timber, the exposed timber must, by repeated applications, be saturated with hot creosote oil, and then well daubed with hot asphaltum. Every gang using this timber must have a supply of oil and asphaltum, and a suitable kettle for heating it. Where possible, holes bored in creosoted material are to be filled with creosote before inserting bolts.

Timber having checks or shakes or signs of decay, must not be treated, and the superintendent of the creosoting works must not creosote material which has these defects.

UNLOADING PILING FROM CARS.

Piling and round timbers have a tendency to shift during transit, and crowd the car stakes, so employees must take every precaution to avoid accident in unloading this class of material, especially where derricks are not available. The person in charge should first examine the loads carefully to see that the stakes are not broken, that the wiring is intact and that there is not excessive pressure against the stakes. The lower outside pile should be blocked on the car or bearing piece at each end to prevent its rolling off.

For loads that do not show signs of shifting, the proper procedure for unloading is as follows: If there are any piles above the top wire, the stakes should be cut to permit rolling one course off at a time, until the wires are reached. The wires should then be untwisted, or slackened, until it is determined that the stakes are strong enough to hold the load before entirely releasing the wires. Where the wires cannot be untwisted, or slackened, they may be cut, but if there is any strain on them, a binder of rope should be put across opposite stakes to hold them while the wires are being cut. This rope should then be slackened a little at a time to see that the stakes are able to take the strain before entirely slackening it. After removing the wires, the stakes should be cut so as to permit of the removal of one course at a time until it is determined that the load will not shift, when stakes may be removed, and the car unloaded in the usual manner, using such skids as may be necessary to keep the piles from falling on the ground.

Where the load shows signs of shifting, in addition to the above precautions, a binder of rope of not less than 4½ in. in circumference must be placed around each end of the load, and tightened as much as possible, to secure the load against sudden shifting when wires are cut.

Men unloading piles should be warned that there is some liability of piles rolling off the car on the opposite side from which stakes are removed, and proper precautions should be taken to see that no one would be injured if this should happen.

It is recognized that there may be cases where the above instructions cannot be followed exactly, but, in such event, only experienced men should be employed and every precaution taken to avoid accident.

SHOULD A FOREMAN WORK WITH HIS MEN?

Several Discussions of This Question Which Is of Live Concern to Maintenance Men at the Present Time

THE extent to which a foreman should work with his men has been the subject of extended discussion from time to time. It is not a new problem, although it is a very real one for every foreman who is placed in charge of a gang for the first time. On its correct solution depends to a considerable extent the efficiency of the gang and the labor cost of the work under way. Conditions vary with different classes of labor, with gangs of different sizes, with the density and class of the traffic and with other local conditions. No one rule can be laid down for universal application. At the present time when labor is so scarce, when practically all gangs are short of men and when there is added incentive for a foreman to assist in productive work in order to increase the output of his force this subject is of particular interest. The discussions which appear below present various phases of this problem.

MEN MUST BE TAUGHT AND GUARDED

By E. Keough

Assistant Engineer Maintenance of Way, Canadian Pacific, Montreal, Que.

A section foreman's physical efforts should vary with the importance of the position he holds the same as other railway employees. A foreman on a branch section with but one or two men certainly is expected to "make a hand," or, better still, to set the pace. When his duties become more complex, as they do when in charge of a main line or yard section, his work should only be changed and certainly not lessened. He is then expected to be on the alert to see that all his men perform their duties in a workmanlike manner instead of by some awkward way they have accidentally fallen into themselves.

It matters little whether the laborer is a foreigner or a track apprentice, he needs competent instruction in the proper methods of handling tools and doing the various kinds of work called on in track maintenance. Too often we find laborers who have worked at a certain job long enough to be expert, still handling tools in the most unskilled and laborious manner. The shovel alone is a tool more often mishandled than any other one on the list.

Such problems as unloading high side coal cars of cinders are too often regarded by foremen as work requiring no physical exercise from them except to assign so many men to a car, and let nature take its course. In such gangs one will find many men throwing cinders "cross armed" instead of working "with their hand" in a perfectly natural manner. Such laborers cannot do justice to themselves nor to their employers and need coaching the very day they start out. During the past few months I have seen laborers pulling in ties with one or both feet ahead of the new tie, so that a slight extra shove by the man "tailing" the tie is liable to cause an accident.

The foremen who can be classed among the inactive ones are not on the lookout for such conditions. They have seen other foremen in similar positions apparently "at ease" and as soon as they are placed in charge of men they consider their laboring days at an end. Such men are of no further use to a railroad in this capacity. Section foremen, with rare exceptions, come from section or extra gang laborers and have always been used to activity. The fellow who quits work when made foreman cannot possibly remain efficient.

The fact that we so often see foremen in charge of men standing idle as trains are passing leads us to suppose he is in the "no work" class. Good men are often misjudged by new officials in this way. The density of traffic on roads with two or more tracks necessitates alertness on the foreman's part to see that the work is carried out without danger to his men or trains. After all, it is results which go furthest and the roadmaster or supervisor soon should know who is giving his best efforts to the company.

SAFETY OF MEN AND CHARACTER OF LABOR THE PRINCIPAL CONSIDERATIONS

By W. F. Rench

Superintendent of Track Construction, Wrightstown (N. J.) Cantonment

In the section of the book of rules of some roads wherein are defined the duties of track foremen there still occurs the clause specifying that they shall personally engage in work. This requirement is virtually suspended on high-speed main lines, because of the imperative need of foremen giving their attention to the protection of their men from accidents. The rules for the conduct of men working on or about the tracks impose upon a foreman the duty of warning his men of the approach of trains in ample time to enable them to reach a place of safety. This duty may be neglected if the foreman personally engages in work, and it is one that he cannot delegate to his assistants.

There are many exceptional occasions in which the track is broken in rail renewal or switch installation, when the foreman should unquestionably work along with his men. This is especially the case when the laborers are fairly expert in their work and of a class that will always work diligently, but it is, of course, not practicable with a large gang, or with one composed mainly of inexperienced foreigners. The average section gang as now constituted will perform little or no work unless the duties are definitely laid out for each operation. The Italian laborer, perhaps the best outside of natives, will only do a good day's work when he is guided specifically by his foreman. The Mexican laborer requires even more patient direction, and the negro will invariably "soldier" while the foreman is engaged.

Doubtless there are many occasions when judicious help from the foreman is appropriate to tide over a difficult situation, or to illustrate a method of work; but such assistance should generally be limited to actual necessity. The foreman's principal business on a main line is to avoid accident to his men and to guide them in efficient ways of working. For the maximum usefulness of the foreman, the gang should contain an assistant foreman and a first laborer, the first to aid in carrying out his plan of work, and second, to lead the men into good performance of the assigned task.

On branch lines the situation is somewhat different. The danger from trains is not so great, and the labor is more likely to be native because of the removal of these

lines from the centers of industry. Also, the section force is generally smaller and therefore more easily controlled. Where a foreman has only four or five men in his gang he must of necessity work with them in order to accomplish the season's program. A considerable portion of the general repair work of the section consists of track raising and rail renewal, which can best be effected by a combination of section forces. The absurdity of several foreman taking no actual part in such work is a self-evident proposition.

Probably the best guide to the appropriate extent of a foreman's participation in the work is his individual judgment. The one essential in the maintenance of a section is thus an intelligent, loyal, well-trained foreman; he will manage to make out somehow with whatever force may be at his command and will obtain results in spite of the handicap of a poor class of labor.

A PROBLEM FOR INDIVIDUAL ATTENTION

By J. T. Bowser
Chief Clerk, Maintenance of Way Department, Southern, Danville, Ky.

The general scarcity of track labor and the probable increase in the shortage of men in the near future, owing to military requirements, and the demands for men for classes of manufacturing affected by the war, again brings up the question of the extent to which section foremen and other foremen in the maintenance of way department should engage in the actual labor of track work. This question has been discussed frequently and it is very generally conceded that, with the exception of those who have charge of gangs on branch or other lines where the forces are small and traffic light, a foreman obtains best results by confining his activities almost entirely to the direction of the efforts of the men, rather than by participating to any great extent in the actual labor.

With a gang of six or more men a foreman's attention is best devoted to seeing that the men perform the work properly and that all necessary precautions are taken for the safety of the men and the work. With smaller gangs he can no doubt engage to some extent in the actual labor and still see that the work is properly done, and not have his attention so wholly absorbed as to overlook any necessary precaution against accident. In the case of yard gangs, or other gangs working where traffic is very heavy, foremen should never abandon their supervisory duties to engage in anything which requires close attention without first detailing some responsible man to keep a lookout. Of course, on any gang it is often necessary for a foreman to demonstrate manually the proper method when instructing his men, but this usually requires only a few minutes and does not constitute any departure from his usual duties. Further, on the larger gangs where the men are perforce scattered to some extent, there is ordinarily an immediate slowing down when the foreman's attention is engaged elsewhere, and the performance of actual labor by the foremen as a general practice is likely to result in a reduction of both the standard and the quantity of work done.

In the opinion of the writer it would not be wise to make any hard and fast rule in this matter or to issue any general instructions concerning it. A better method would probably be to have the track supervisor adopt a policy of suggesting it to, and requiring it of, the individual foreman when conditions seem to warrant it. Small gangs, resulting from the reduction of force or inability to secure labor, or classes of work requiring less careful supervision, such as mowing right of way, dressing ballast or light ditching, might be considered conditions which would warrant requiring the foremen to take part in the work.

Labor for track work is already a scarce commodity and it is likely to become scarcer, and, further, it is incumbent on the railroads to get along with as few men as possible. For these reasons more in the way of actual labor is to be expected and required of the foremen, but it will probably be found best to have the matter placed before the foremen not as a general requirement, but as a matter to be left to their judgment, with the proper supervision from the supervisor to see that they do not err to any great extent in either direction.

FOREMEN SHOULD NOT BE AFRAID TO WORK

By A. M. Clough
Supervisor, New York Central, Batavia, N. Y.

The extent to which a foreman should work with his men must be considered with respect to the size of the gang, where it is working and what the work consists of. It would not be consistent to expect a foreman of a gang of 25 or more men to do more than direct them, and if the work is in a congested location with many trains he will have all he can do to keep them away from injury. Neither is it consistent to expect a foreman of 10 or more men to work as a partner with one of the laborers. Below this number, and particularly if an odd man is in the gang, I think the foreman should, at least during certain times of the day, take part in some of the work being done. In general, however, the foremen are now so alive to the fact that we are in the throes of unfavorable labor conditions and are so imbued with the responsibility resting upon them that it is not usually necessary to prescribe the conditions under which they should or should not work.

It is generally understood in the East that section foremen lead their men, not necessarily doing the same work that the men do, but dressing in working clothes, sighting and lining their track, etc. Where new men are employed the section foremen use extra efforts to instruct them in the proper use of tools and in their duties as trackmen.

Extra gang foremen who have been taken from sections are placed in a different position, being at the head of larger forces. They must direct and keep general supervision over their men and their work, each foreman being provided with an assistant foreman who moves around among the men, lifting, lining track and following out the routine laid down by the foreman, while the foreman himself properly supervises.

The ideal foreman and the man who generally succeeds to higher positions is a man who is not afraid to soil his hands or his clothes, and who does not stand five or ten paces away and watch his men work, who is resourceful, alert to conserve his men's labor and his company's material, and is patient, though firm, with those under him. Such a foreman will always command respect from his employer and his employees.

AFTER FORTY YEARS' EXPERIENCE

By Dan Devoy
Section Foreman, Chicago, Milwaukee & St. Paul, Ottumwa Jct., Ia.

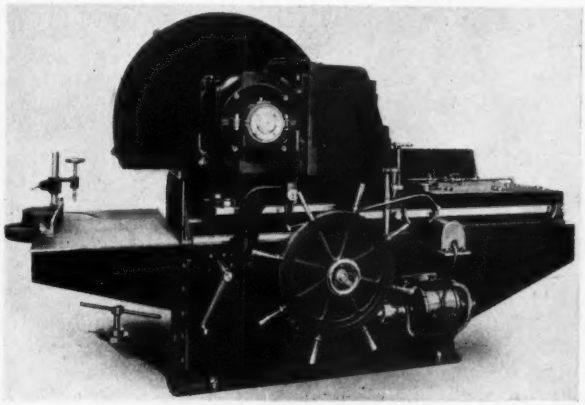
At the beginning of a day's work a foreman should announce his plans and give his instructions to each man or group of men and at any time that his assistance is necessary he should apply himself. I do not believe that a foreman should be a leading laborer, as some officers

expect, neither do I believe he should be the drone of the gang.

He should be energetic, interested in his work and ready to fill the place of an absent man at any time the occasion calls for it. I have always maintained that when a foreman assumes a laborer's place some one will be found in the gang who is filling the foreman's position as an idler (the necessary supervision being lacking). I have noticed time and again when a foreman's shovel was busy some of the laborers would be standing motionless at the same time. Looking back over conditions that have come under my observation as foreman for the past 40 years, I have come to the conclusion that a foreman should work some, but not all the time, as he has other duties to perform and must be responsible for the work in his charge.

A HIGH SPEED FRICTION SAW

WITH the higher cost of steel rails and the increased difficulty encountered in securing deliveries, more attention is being given to the reclamation of second-hand rails in order that the maximum service may be secured from them when relayed. Owing to the fact that rails on tangent tracks are taken up largely because of the characteristic battering of the head near the ends of the rails and the wearing of the fishing surfaces, several railroads have adopted the practice of sawing off these damaged ends before returning the rails to service. The economy of this operation is naturally dependent upon the efficiency with which the sawing can be done.



SIDE VIEW OF THE SAW

The idea of the friction saw has been in practical application in some industries for about 10 years, but it is only within the last 4 years that it has been developed for the cutting of rails in reclamation work. In the friction saw the metal is melted or burned away by the heat generated through the friction of the rapidly moving saw blade against the metal of the piece being sawed. It has the advantage of extreme rapidity of action and economy in operation and maintenance. As the saw blades are without teeth they are much cheaper than the regular tooth saw and can be replaced at much smaller expense.

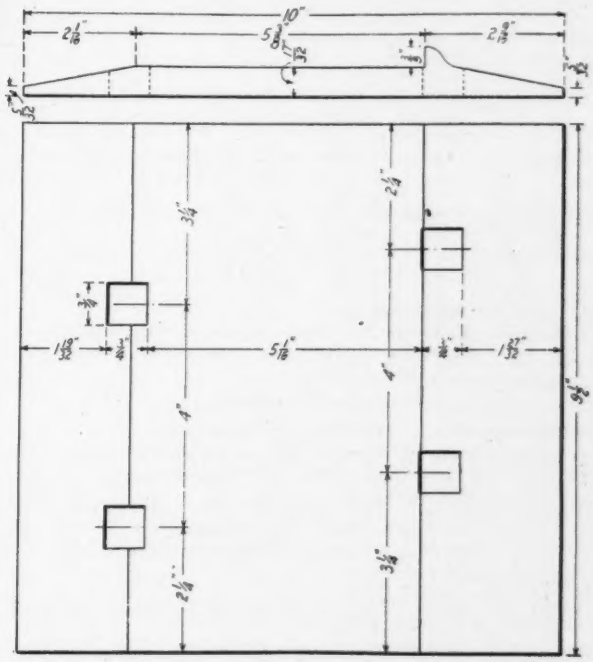
The saw machine shown in the illustrtion has a toothless blade 46 in. in diameter by ¼ in. thick, direct connected to a 45-hp. electric motor. The saw and motor are mounted on a carriage propelled by a second motor of 1 hp. capacity attached to the side of the machine base. Through the movement of this carriage the saw is brought into contact with the rail and caused to follow through as the metal is cut away. When the operation is completed the carriage motor is reversed and the saw is withdrawn. The entire outfit weighs less than 13,000 lb.

Another advantage of the machine is that the rail can be cut without need of clamping it into fixed position. As seen in the photograph, the center line of the saw blade is mounted slightly above the rail section. Consequently the blade itself answers as a sort of automatic clamping device, forcing the rails hard against the retaining clamp attached to the table.

Installations of these saws at railway reclaiming plants include one at the rail mill of the Chicago & North Western at Boone, Ia., and one at the reclaiming shop of the Chicago Great Western at Oelwein, Ia. The saw at the Boone plant has been operated at a cost of $0.54 per gross ton of rails handled, including the cost of unloading, cutting, drilling, reloading, and removal of the scrap. Rails of 72 lb. section have been cut off in 20 sec. and as many as 354 rails have been sawed in 10 hours.. This high speed friction saw is manufactured by Joseph T. Ryerson & Son, Chicago, Ill.

LARGE TIES AND TIE PLATES

WITH the object of increasing the strength of the track structure to more safely withstand the present day loading and also to distribute the loads over a greater area of the ties and thus avoid the cutting of the wood fibres, the Southern Pacific adopted a 7-in. by 10-in. by 8-ft. tie as standard for main line tracks two years ago. Prior to this time the standard tie for all service was 7 in. by 9 in. by 8 ft. With the adoption of the larger tie for main line a 7-in. by 8-in. by 8-ft. tie was made standard for use in branch lines and sidings, these relative sizes conforming more nearly to the comparative service requirements. Eighteen ties are used per 33-ft. panel.



DETAILS OF THE TIE PLATE

The adoption of the larger tie has enabled the size of the standard tie plates for main line use to be increased to 9½ in. by 10 in., giving 95 sq. in. of bearing area on the timber as compared with 70 in. with the plate formerly used. This tie plate is 17-32 in. thick and has a ⅜-in. shoulder. It extends 2 19-32 in. beyond the base of the rail on the shoulder side and 2 9-32 in. beyond the base on the inside. It weighs 12.21 lb. The use of these larger plates has been found to decrease materially the tendency of the rail to "roll out" on curves.

THE ROADMASTERS' CONVENTION

AT a meeting of the Executive Committee of the Roadmasters' and Maintenance of Way Association, held in Chicago on July 14, it was decided to hold the annual convention at Chicago, beginning on September 18 as planned, but to shorten it from four days to three days. The advisability of postponing the convention this year was considered carefully, but it was decided that the complicated and serious problems with reference to labor and material which are now confronting track men made the exchange of information more than usually desirable. The program of committee work, which was prepared last fall, was revised to permit the sessions on Wednesday to be devoted to the consideration of those phases of the labor and material problems which are of so much concern to the track department at present. The program is as follows:

TUESDAY, SEPTEMBER 18

9:30 A. M. Convention called to order.
Reports of president, secretary and treasurer.
Appointment of committees on nominations, resolutions, auditing, etc.
10:30 A. M. Committee report. Recommended methods for the inspection of ties in track and recommendations for renewals.
Discussion.
12:30 P. M. Adjournment.
2:00 P. M. Committee report. The Best Methods of Securing and Retaining Track Labor.
Discussion.
4:30 P. M. Paper. Maintenance of Track in Large Terminals, C. J. Coon, Engineer of Track, Grand Central Terminal, New York.
Discussion.
5:30 P. M. Adjournment.
7:30 P. M. Paper. Economical Methods of Maintaining Street and Highway Crossings, M. J. Griffin, supervisor, C. R. R. of N. J., Jersey City, N. J.
Discussion.
8:30 P. M. Building the Tracks at the Cantonments, Coleman King, supervisor, Long Island, Jamaica, N. Y., and others.

WEDNESDAY, SEPTEMBER 19

9:30 A. M. Paper. The Present Maintenance of Way Material Problem, W. A. Summerhays, assistant purchasing agent, Illinois Central.
Discussion.
11:30 A. M. Paper. The Oiling of Rails and Fastenings to Protect Them from Corrosion, E. T. Howson, editor, *The Railway Maintenance Engineer.*
Discussion.
12:30 P. M. Adjournment.
2:00 P. M. Paper. Housing and Feeding Maintenance of Way Laborers.
Discussion.
3:00 P. M. Paper. Labor-saving Devices for Track Work.
Discussion.
4:00 P. M. Inspection of Exhibits, Track Supply Association.
7:00 P. M. Annual banquet given by the Track Supply Association.

THURSDAY, SEPTEMBER 20

9:30 A. M. Discussion of Current Track Problems.
10:30 A. M. The Inspection of Rails During Their Manufacture, by Chas. W. Gennett, Jr., manager, Rail Inspection Department, R. W. Hunt & Co.
11:00 A. M. Election of officers.
Selection of meeting place for next convention.
Closing business.
12:00 M. Adjournment.
1:00 P. M. Leave for inspection of rail mill of the Illinois Steel Company, Gary, Ind.

The Track Supply Association is planning to hold an exhibit in conjunction with the convention and plans are already well under way for representation by a large number of firms.

A NEW AUTOMATIC AIR DUMP CAR

AMONG interesting developments in heavy and high capacity dirt and rock handling equipment may be mentioned the automatic air operated steel dump cars built by the Orenstein-Arthur Koppel Company of Koppel, Pa. The illustrations show cars of the Missabi type built for the Oliver Iron Mining Company according to Master Car Builders and Interstate Commerce requirements. These cars are entirely automatic, being operated by compressed air from pump and operating valves located on the locomotive. However, they may

CAR IN THE DUMPING POSITION

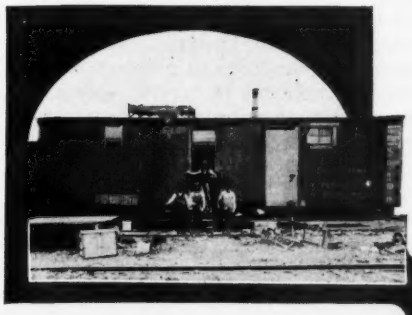
be operated individually from each car and may be dumped all to one side or part to one side and part to the other.

The body of each car is held in its normal load-carrying position by a locking device and is supported in this position by bolsters, which hold the body securely at four places. Two dumping cylinders are located in the middle of each car, one on each side of the center sill. When air is admitted to the cylinder for dumping, the first few inches of travel of the piston releases the locking device on one side of the car, and the further travel of the piston dumps the body. A distinctive feature is the automatic air cut-off controlled entirely by the movement of the body. When the load is heaped to one side or when other conditions make the dumping easy, little air is required to operate this car, and cases have been noted where the car was dumped and the air shut off, before the piston made one-half its travel. The saving in air thus afforded eliminates the necessity for individual air reservoirs on the cars.

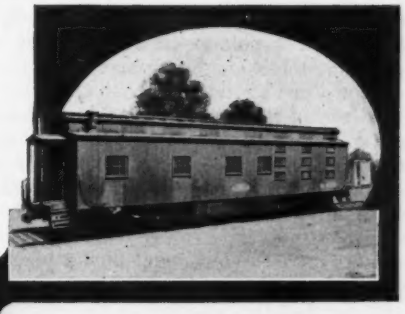
Another feature is the locking device which projects outside the body bolsters, where it is open to easy inspection and free from danger of becoming inoperative because of snow, ice, dirt, etc. All valves are standard Westinghouse plug cocks, proof against freezing weather. The possibility of accidental dumping from leaky valves is eliminated through a construction which holds the cylinder cocks wide open at all times when the bodies are in the normal load-carrying position.

BETTER HOUSING OF MAINTENANCE MEN

Improving the Living Conditions of Railroad Laborers in Camps as a Means of Holding Them Longer in the Service. Present Labor Turnover too Large



The Old Way



The New Way

THE current scarcity of labor has caused the employers of men in large numbers to make greatly increased efforts, not only to secure the men required, but also to hold those already to service. Realizing that the wage rate is not the only consideration, attention has been directed to other factors that enter largely into the attractiveness of the employment from the standpoint of the laborer. In previous issues of the *Railway Maintenance Engineer* there have appeared discussions of the employment agency and the methods followed in feeding the men. On this and following pages another important phase of this matter is treated, namely, the need of providing suitable living quarters.

A movement for the regulation of labor camps by state authorities have caused the railways to give this matter somewhat closer supervision. However, the need of providing desirable quarters as a means of attracting and retaining men has been the most vital influence in effecting the serious attention of railway officers to this subject. Many roads are taking steps to improve the bunk cars and houses furnished to maintenance of way laborers. There has also been a movement to redesign camp cars along more sanitary lines and in some cases to abandon their use in favor of portable buildings or even tents. One road in the Southwest where Mexicans are largely employed is now building permanent barracks of hollow tile with concrete floors, thereby permitting the periodic flushing with hot or cold water as frequently as conditions demand. In the accounts given below emphasis is placed on the fact that improved quarters are a benefit not only because the men are attracted and retained by the improved surroundings, but also because of the increased efficiency of men who live in clean and comfortable quarters.

Sanitary Inspection

One phase of the housing problem which has not been given the concentrated attention which it deserves is that of trained sanitary inspection of the camps and the enforcement of regulations tending to promote the health of the employees. Starting about five years ago, the Chicago & North Western organized a sanitary department under the direction of a chief sanitary engineer, who reports directly to the operating vice-president. This chief sanitary inspector is a physician who gives his entire time to problems of this character on the road. In addition to other duties he has jurisdiction over all maintenance of way camps on the system and spends over half of his time on the road. He visits each camp personally, giving special attention to the condition of the refrigerators, the commissary and the character of the food served, having analyses made of all food considered suspicious. He sees that all doors and windows in the camp are screened and makes frequent analyses of water at a wide variety of points over the system. If the water at any site selected for a camp is not known by analysis to be satisfactory, water is hauled to the camp in remodeled locomotive tenders. To insure the maintenance of these tanks in a sanitary condition they are sterilized with live steam once each week.

The supervision of these camps also extends to the fumigation of the cars and bedding at regular intervals. Deodorants and disinfectants are provided at each camp and special attention is given to the provision of adequate sanitary toilet facilities. All sickness threatening an epidemic of any kind is reported promptly to the chief sanitary inspector, who goes to the camp at once and places the necessary restrictions in force. As a result of these precautions there has been no epidemic of any kind in any camp on this road during the five years this system has been in force.

RADICAL IMPROVEMENTS NECESSARY TO HOLD MEN

By Maintenance Engineer

There is, of course, no single factor that explains why one railroad is able to hold forces under present conditions and another road cannot hold men. Labor as a whole is keenly alive to the present shortage and is moving from place to place, trying to secure higher rates and concessions, which in effect amount to advances in wages or which lessen the cost of living. The labor turnover in the maintenance of way department to-day is appalling. In the mechanical industry the turnover in some plants amounts to 75 per cent per year; in other words, three-fourths of the workers in American factories leave their jobs every year and are replaced by others. Before the day of scientific management this was regarded rather as vexatious than anything else, but now it is appreciated that it is very expensive. Most shop managers estimate the cost of each man hired at from $40 to $200 and $75 is not far from the average. This is not only a direct loss to the manufacturer, but is an enormous economic waste. This same loss applies to the excessive turnover in railroad labor and while the cost to the railroad per man is not as high as the figures given above, it is nevertheless very real and amounts to a large sum in the aggregate.

The more important reasons that account for the large turnover in railroad labor are (1) low wages, (2) unfavorable working conditions, (3) unsatisfactory treatment by foremen, (4) living conditions that violate all of our ideas of health, decency and efficiency. It is not the purpose to enlarge on the errors of the past, but it is time that these conditions are pointed out frankly and prompt measures taken to correct them.

Referring to wages and unfair working conditions, the writer knows of three railroads that are paying practically one dollar less per day than the market price for common labor, and in order to take care of work that is absolutely necessary and for which they have no forces available they have made blanket contracts with contractors on a force account plus a percentage basis. The contractors, of course, pay the market price of the district, so that the net cost to the railroad is about $1.25 per man per day above what it pays its own men, yet the railroad wonders why it cannot get and hold men.

He also knows of several railroads that are keeping their maintenance work up by running forces out of a large city in the morning and returning them any time up until nine and ten o'clock in the evening. The men are allowed time for the whole number of hours they are out, and as the actual time worked is not much over half a day, this, added to the cost of train service, makes the net cost very high. How much better it would be to meet the question squarely and pay the market price instead of "beating the devil around the stump."

Referring to living conditions, it is common knowledge that the average railroad camp is not only unsanitary and frequently unfit for human beings to live in, but that it is a menace to the community in which it is placed. It is generally overcrowded, poorly constructed, an offence to the eye, unsanitary, and the grounds around the camp are frequently covered with rubbish, tin cans and debris that make it anything else than a place that would attract men or which would tend to hold them. Few roads make any provision for women and children and it is not uncommon to see them crowded in among the men in a way that can be nothing but a detriment to all concerned.

As a matter of fact, the employer of common labor has a double responsibility, (1) to the community in which the men live in that nothing should be done that is a menace to health or a source of annoyance, and (2) a duty to provide such working and living conditions that these men, by example, precept and instruction, may attain to the standards of living of the American with whom they are to become assimilated. We owe this debt to the future and in paying it we will go a long way towards solving our present problem.

In this connection it may be added that several states have taken up this question and, through state boards, are establishing regulations that cover all labor camps. This illustrates clearly that conditions exist that are contrary to the public good. It would seem preferable for the railroads to bring about better conditions of their own accord rather than to be forced into them by public authorities.

Below are some brief suggestions along this line and which may at the present time appear burdensome and unnecessary to some, It is believed, however, that the time has arrived when camp design and operation must receive careful attention and supervision.

The matter of site and soil conditions are of real importance. While under poor natural conditions good health may be maintained if proper sanitary measures are taken, the chances are that even under the most favorable circumstances conditions will be none too good. Preference should be given to a location that will provide natural drainage and the various buildings of the camp should be so placed that the rainfall from one will not run down around those adjacent. No pools of stagnant water should be permitted within 500 ft. of the camp and a greater distance is desirable. The camp should be far enough from the track to reduce noise and dust to a minimum, and it should be easy of access, not only to the inhabitants of the camp, but also for wagons bringing in supplies, etc. If the location is near a station where there is regular train service, so much the better. If no local stores are near the camp, some provision must be made so that the men can purchase food, clothing and other supplies.

One of the worst features of the present camp is overcrowding. It is believed that between 350 and 400 cu. ft. of space should be allowed to each man. In a building used only for sleeping quarters with beds or cots properly spaced and sufficient windows, this will allow ample ventilation.

As a general proposition, while more expensive, it is better to provide a number of small buildings rather than one or two large ones. A small building, perhaps 18 ft. by 40 or 50 ft., will take care of from 16 to 25 men. The objection to the large building is that it is impossible to put very many men in one building and not have them disturb each other, there is more danger from fire, greater danger of the spread of disease, ventilation is more difficult, and more attention is required to keep the building clean. Again, if small buildings are used more spare buildings may be provided, making it possible to completely fumigate and clean one building at a time. The buildings should be well built, with double floors, ceiled inside and covered with weather boarding and battens. Ample window space should be had for light and ventilation and the doors and windows should be screened in summer.

Beds or bunks should be of steel, with single bunks in all cases. If wooden bunks are used they should not be attached to the walls or floor. The bunks should be removed frequently so that the floor may be swept and disinfected. Distinction should be made between disinfecting, deodorizing and fumigating and the proper materials used to produce the results desired. No cooking should be done in the building where the men sleep. The doors and windows of the sleeping quarters should be thrown open and the rooms thoroughly ventilated each day.

A feature which will yield an excellent return on an investment in a camp is the construction of an extra building or room which can be used as a club or lounging room by the men during their leisure hours, eliminating the necessity of their loafing about their bunks on rainy evenings. The placing of a few daily and illustrated papers in this room will also be found to meet with much favor on the part of the men. In many instances attention to details such as these will do more than the construction of expensive facilities to hold men.

All cooking and eating should be done in a separate building and the cooks should be compelled to sleep in the sleeping quarters. This building should be especially well ventilated, all doors and windows being screened. Waste water should be carried away from the camp in drains and all garbage should be put in metal cans and burned or taken away from the camp daily. Drinking water used in the camp must be of ample quantity and analyzed at least every three months. Wells should be protected from surface contamination and should not be placed near closets, stables, etc.

Cooking utensils should be furnished by the railroad

company and care should be taken to select pieces that will not be difficult to keep clean. For the table, plates and cups of enameled ware answer very well.

Personal cleanliness is one of the most important factors in maintaining health for the reason that disease is largely transmitted by contact. Facilities should, therefore, be provided for the men to bathe and they should be encouraged to do so. Baths that will answer every purpose can be constructed easily and cheaply. The great danger is that something more elaborate than necessary will be designed and the cost will lead to this feature being left out.

Unless cared for systematically, rubbish tends to collect in and around any camp. There should be at least one man assigned to the camp whose duty is to keep it clean and to disinfect it regularly. This man should also act as a watchman while the gang is away at work. Anything that will teach the men cleanliness and neatness should be encouraged.

The most efficient way of taking care of human waste, including urine, is by burning, and it is entirely practicable to collect and burn such waste. Closets may be provided with metal cans that are portable and a furnace can be built where they can be emptied and burned daily. Closets should be screened and well ventilated.

Most railroad men know that the average camp is foul smelling, dirty, swarms with flies, is poorly ventilated and is frequently overcrowded. The railroad that seriously wants to hold forces under present conditions or that has the welfare of its men and the community at heart will take prompt steps to correct present practices in regard to camps. It will be found that this is not only the right thing to do, but that it will pay.

SUGGESTIONS FOR CAMP BETTERMENT

By F. E. Weise

Chief Clerk, Engineering Department, Chicago, Milwaukee & St. Paul, Chicago, Ill.

In the establishment of a railway camp, first consideration is usually given to the problem of feeding the men, under the assumption that if men are properly fed they can be expected to return efficient service. While food is an important item, there are other matters of equal importance, and a camp will not accomplish its full purpose unless all of its phases and factors are given due consideration. The purpose of the camp should be to keep the men as nearly 100 per cent efficient as possible.

When it has been decided that a camp is to be established, the site of the work should be examined carefully and the location of the camp determined upon by considering the conditions that will make it habitable. Location, water supply, drainage and sanitation should be given careful study. If located on the railway right of way, the space may be limited and the buildings will have to be placed in a row. If so, the office building should always be between the dining room and the sleeping quarters. In some cases sufficient unusued land is available so as to allow a more compact arrangement, and in others the physical conditions will in large measure control the layout.

Bunk Houses

The construction of the bunk house will depend upon the locality and the season during which it is to be used. If in use during the winter, it must be quite substantially built to withstand storms and cold. If used only for a few months during the summer or in very warm climates, it may be of very light construction, but it should always be so built that it will keep out the rain. It should be high enough above the ground to enable a man to get under it, and it should be made a positive rule that the space underneath must be kept clean and that no accumulation of rubbish or old clothes will be allowed.

Bunk houses or sleeping quarters should not be made too large. It is much better to have a number of smaller houses than to endeavor to make one building large enough to provide for the entire force. There are apt to be disturbing factors during the night which would disturb the entire camp if all were housed in one building. For labor, it has been found desirable to have houses that will accommodate from 30 to 40 men each, although some would limit the number to 24.

Houses built rather long and narrow with bunks on either side and a central aisle, with a good supply of

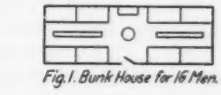


Fig. 1. Bunk House for 16 Men.

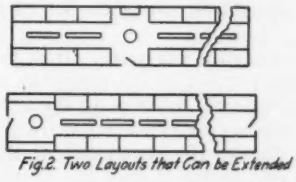


Fig. 2. Two Layouts that Can be Extended

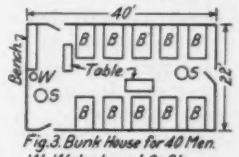


Fig. 3. Bunk House for 40 Men. W=Water barrel. S=Stoves. B=Double deck steel bunks, 4 men each.

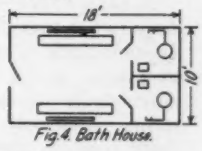


Fig. 4. Bath House.

Plans for Bunk Houses

windows, appear to be the most satisfactory. If such buildings have to be built, this style has the added advantage that it can be loaded on flat cars and transported from place to place. A different arrangement of bunks may be thought better and the sketches show several different arrangements that have proven satisfactory. In very large camps it is at times decided to build houses that will accommodate more than 40 men, but because of their size, they are more costly. It is quite customary to build bunks of wood, but great improvements have been made in the last few years in the manufacture of steel bunks, and they are being installed in many camps because of their greater comfort, and the ease with which they are kept clean and sanitary.

One item, which at first thought may seem an extravagance but which will do much to hold the men, is the installation of individual lockers. Metal lockers may be deemed too expensive, but are more sanitary. They will be in good condition when the camp is taken down and can be used elsewhere. Wooden lockers with doors having an opening of wire mesh can be constructed easily and cheaply. They should be built in two tiers, two feet square and four feet high, large enough to hold a suitcase. Good locks should be furnished with individual keys, each man being given a key attached to a metal tag bearing the same number as the locker. The key is charged up to him and he is obliged to turn it in when he leaves before receiving his pay. Lost keys are charged to the men and deducted from their pay.

In spite of the utmost precaution, there is danger of trouble from vermin. Men are likely to carry it in their clothing from other camps. Therefore, a rule should be made to fumigate each bunk house once a month. After the men have left for work in the morning, the bedding should all be taken out, the mattresses turned up, the doors and windows and ventilators closed, and sulphur candles burned. The dose should be twice that recommended by the manufacturer, because bunk houses cannot be sealed as tightly as rooms in a house. After

fumigation, the bunk house should be aired thoroughly before it is occupied again.

CAMP ATTENDANTS

The sleeping quarters are kept clean and in order by a camp man, whose duties are to sweep, carry coal and keep the bunks in order. Bunk houses, except in very warm climates, or when only used for a short period during the summer months, should always be provided with stoves, and railway caboose stoves are well adapted to that purpose. In cold weather men must have a place to warm up, and in wet weather there always is clothing to be dried out. Sleeping quarters should not be allowed to become damp and musty.

Water barrels, one at each end of each camp building, should be provided and supplied with sufficient buckets for fire protection. In the winter time the water should be salted heavily or saturated with some anti-freezing mixture. It should be the camp man's duty to examine each barrel every day and see that it is filled and ready for use. A pail with a rounded bottom, marked "To be used only in case of fire," should be provided for each barrel.

A camp night watchman is also a necessity. It is his duty to see that the lights are put out at the proper time (nine o'clock is a good hour to set), to keep up the fires in winter, so see that late comers or those who are inclined to be up late do not disturb the remainder of the camp. Men will sleep and rest better if they know that there is some one on guard to see that they are not disturbed or robbed, and a good night's sleep means better work the next day. The watchman is also there for prompt action in case of sickness, fire or any other emergency. It is his duty to awake the men at the proper time each morning; first the cook and flunkies, in order that breakfast may be started on time, then the men, to get them up in time for breakfast and thus start the day right.

LIGHT, VENTILATION AND SANITATION

When it can be had, electricity is the ideal method of lighting a camp, and it can frequently be supplied without undue cost. The camp may be near a town having a power plant or near some power line from which current may be obtained. Electric light will do much to insure cleanliness, a temporary installation is not expensive, and it will also materially reduce the fire hazard. Where ordinary lamps must be used, they should be kept clean and in good order at all times, and their placing should be so safeguarded that they are not liable to be overturned or knocked over. Bracket lamps fastened to the wall as high as possible and equipped with metal protectors may be used. In many places lanterns will furnish ample light and are safer.

All camp buildings should be provided with sufficient means for ventilation, even though built in the most temporary manner, and this refers particularly to the sleeping quarters. Sufficient fresh air without unnecessary exposure to cold and storms will do much to keep the working force in good condition. Should the dining-room become too hot and stuffy during meal time, the men will complain and the matter can easily be remedied, but at night men are apt to sleep in poorly ventilated bunk houses without realizing why they do not feel rested and refreshed in the morning. It should be made the particular business of some one man in each bunk house to see that there is a sufficient circulation of air before he retires. All windows shall be in condition to open and close readily, and the roof should be provided with ventilators. Proper means of ventilation can be installed easily and inexpensively.

Outhouses ample for the needs of the camp must be provided, be made as convenient as possible, and located at a distance not less than 200 ft. from any camp building, and where the natural drainage is away from the camp. The usual procedure is to dig one or more sumps, and erect suitable outbuildings over them. Such buildings should be kept as dark as possible by painting them some dark color and locating them in a group of trees, because flies shun dark places. They should also be screened. They should be kept as clean as possible by sweeping them every day and scrubbing them twice a week. Cleanliness and neatness should not only be encouraged, but insisted upon. The excavation for the sump should be quite deep. Once a week the outbuilding should be moved to one side and a layer of chloride of lime and six inches of earth placed over the excrement. When the filling nears the surface of the ground, the excavation is best filled entirely and a new sump dug in another location.

It is the common experience that in camps established for long periods, it is comparatively easy to get men to comply with rules for sanitation, but they are careless in the small camps established for only a few weeks. Therefore, strict and definite rules must be laid down and their compliance insisted upon as part of the condition of employment.

If the camp is fortunate enough to have a liberal supply of running water so that sanitary toilets and a cesspool may be built, it should be done by all means.

MEDICAL ATTENTION

When a very large number of men are engaged on one piece of work, a resident physician should be employed, whose duty it is to see that the men are cared for not only in cases of injuries, but also in sickness of any kind. If the work will not warrant the employment of a resident physician, arrangements may be made with some local doctor to make periodical visits for general service and to respond to emergency calls.

When a resident physician is not employed, the camp should be provided with medicines and surgical supplies sufficient for rendering first aid to sick or injured. Such supplies should not only consist of bandages, antiseptics, restoratives, etc., for use in cases of shock or injury, but also of simple remedies to relieve the ordinary ailments to which men around a camp are liable, such as colic, cramps, diarrhœa, colds, etc.

It seems almost unnecessary to say that such supplies must be used in an intelligent manner, and yet we read not infrequently of cases where a wrong application has done more harm than good. The man in charge of the camp should be thoroughly familiar with the use of the supplies and he should see to it that others are also instructed in order that there will be one or more men at the camp at all times who can respond to an emergency. Printed instructions should be posted within the chest or cabinet containing the supplies, and someone should be assigned to the duty of keeping the supplies ready for use and to see that renewals are made before the supply of any item becomes exhausted.

The railway company's chief surgeon should designate what is to be kept and outline instructions for its use. Following is a list showing the contents of a medicine chest as supplied by the chief surgeon of the Chicago, Milwaukee & St. Paul for use in camps and also the printed instructions that accompany it:

CONTENTS OF A FULL STANDARD CHEST

1.	Quinine, 2 gr.	25 envelopes
2.	Cough Tablets	25 envelopes
3.	Diarrhœa Tablets	25 envelopes
4.	Headache or Pain Tablets	25 envelopes
5.	Coryza Tablets	25 envelopes

6.	Diuretic Tablets	25 envelopes
7.	Sore Throat (Tonsillitis) Tablets	25 envelopes
8.	Sodium Salicylate Tablets	25 envelopes
9.		
10.	Cathartic Tablets	25 envelopes
11.	Epsom Salts	50 envelopes
12.	Liniment, Solidified	24
13.	Porous Plasters	18
14.	Tincture of Iodine (60 per cent)	2 4-oz. bottles
15.	Gauze	15 packages
16.	Absorbent Cotton	6 4-oz. pkgs.
17.	Adhesive Plaster	6 spools
18.	Bandages, 2 and 3 in. wide	12 each
19.	Vaseline	2 jars
20.	Eye Drops	6 bottles
21.	Toothache Medicine	1 bottle

MEDICINE CHEST INSTRUCTIONS

All Wounds—The aim to protect rather than to treat. Do not wash wounds nor apply any foreign substance. Apply a few drops of tincture of iodine into the wound and apply a piece of gauze and, if necessary, cotton and bandage. Handle as little as possible.

Small Cuts—Apply a few drops of tincture of iodine and close with a narrow strip of adhesive plaster *placed across part of the cut* and bandage.

Burns and Scalds—Apply vaseline and a gauze bandage, and send to the doctor.

Crushing Injuries Without Bleeding—Apply tincture of iodine, gauze and cotton to the wound, bandage, and send to the doctor.

Bleeding—Apply tincture of iodine, gauze and cotton, and then bandage snugly. If bleeding is severe and spurting, apply a bandage about the limb nearer the body and tight enough to control the bleeding. Treat wound as directed and get the patient to the doctor within three hours.

Fractures or Broken Bones.—Apply cotton and two board splints, *wider than limb,* one on each side, and bandage snugly. If skin is broken treat with tincture of iodine as directed. Send to doctor as soon as practicable.

Sprains, Bruises or Lameness.—Apply solid liniment with *plenty of rubbing* twice daily.

Colds in Head—Give two cathartic tablets (No. 10) and two or four coryza tablets (No. 5) at bedtime, or one every hour.

Coughs and "Colds on Chest"—Give one cough tablet (No. 2) every two hours, as needed.

Sore Throat—Allow one sore throat tablet (No. 7) to dissolve slowly in mouth every hour.

Constipation and Biliousness—Give one cathartic tablet (No. 10) night and morning and if necessary a dose of salts (No. 11).

Diarrhoea or Cramps—Give one cathartic tablet (No. 10), or Epsom salts (No. 11), and follow with one diarrhœa tablet (No. 3) every hour for a few doses.

Cinders in Eyes—Do not use matches or other harsh material. If unable to remove with a folded piece of bandage, cover the eye with cotton, apply bandage and send to the doctor.

Eye Inflammation—Drop eye drops in the eyes two to four times daily.

Fever—Give two cathartic tablets (No. 10), and follow with one quinine tablet (No. 1) every four hours as needed. If the fever continues, send to the doctor.

Headache—Give one cathartic tablet (No. 10) and one headache tablet (No. 4).

Neuralgia or Pain—Give one pain tablet (No. 4) every three hours if needed.

Rheumatism and Lumbago—Give one sodium salicylate tablet (No. 8) every three hours, if needed.

Chronic Pain in Back—Use solid liniment (No. 12) with plenty of rubbing, or a porous plaster (No. 13).

Scanty Urine—Give one diuretic tablet (No. 6) every three hours and plenty of water to drink.

Toothache—Place a pledget of cotton saturated with toothache medicine in the cavity, or apply to the gums.

A record should be kept and reports made of all injuries or cases of sickness even though the application of first aid seems at the time all that is necessary. Later developments are sometimes attributed to these minor injuries rightly or otherwise, and a definite entry made at the time will do much to determine the justice of the claim.

MISCELLANEOUS

A few years ago a bathroom and a laundry equipped with hot and cold running water would have been labeled an unnecessary luxury for a construction camp, but they have been tried out and have proven a paying investment. Nothing is more sure to increase a man's self-respect than to be clean and to know that he is in a position to keep so. Men work with greater energy if they can look forward to a refreshing shower bath at the end of a hard day's work.

A convenient layout for a bath house is shown in Fig. 4, a building 10 ft. by 18 ft., having a door at one end and partitioned off at the other so as to provide two small rooms about 5 ft. by 6 ft., equipped with showers. The two small rooms have a good substantial floor of wood with a slope sufficient to drain quickly. On the floor should be laid removable wooden racks or gratings on which the men stand. These should be taken up every day and thoroughly cleaned and the floor scrubbed by the camp man. The showers consist of an 18-in. ring of ¾-in. perforated pipe and a 1-in. steam pipe leading to the mixer. Taps or valves for both hot and cold water are within easy reach along the wall so that each man may easily regulate the temperature of the water. A small bench or stool is also placed in each room. The large room for dressing is supplied with two radiators and two long benches. The building has a gable roof with a ventilator.

It is not necessary to make rules in regard to smoking except that men should not smoke in their bunks because of danger from fire, and that there should be no smoking in the bunk house after the lights are put out at 9:00 p. m. Intoxicating liquors in any form should not be permitted around a camp and habitual drunkards should not be allowed on the work. Gambling should be strictly prohibited.

Even though men are engaged in manual labor, they find rest in active sports such as boxing, wrestling, quoits, baseball, etc., and some provision for such can be made at little expense. For rainy days, indoor games such as checkers, dominoes, etc., will help pass the time agreeably, and books and papers are welcome at all times. At some camps musical instruments have either been provided or are owned by some of the men and do much to help keep the men entertained.

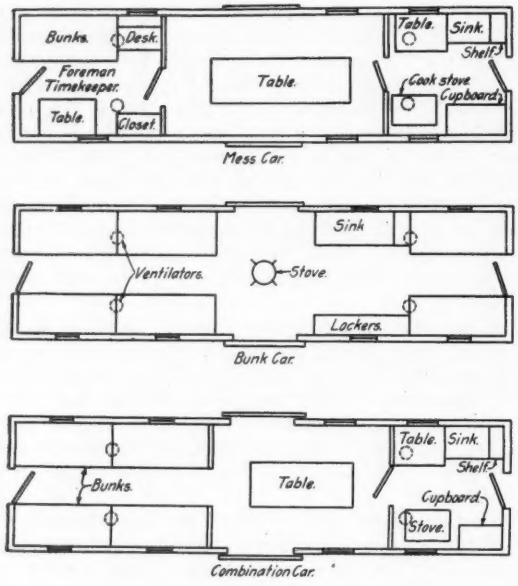
GOOD CAMP CARS HOLD MEN

BY J. W. POWERS
Supervisor, New York Central, Oswego, N. Y.

Present day conditions demonstrate the scarcity of labor, and although it is difficult to predict just what the conditions will be, there are those who predict a more serious stringency at the end of the present war. The majority of railway men are agreed that, next to the question of wages, improved living conditions are the most important factor in securing and holding men. Many railroads are realizing this fact and are giving more attention to the care of their laborers at the present time than they did in former years. Evidences of this are the adoption of more sanitary and attractive living quarters and the substitution of steel bunks for the wooden bunks formerly used. The ordinary wooden bunks are unsatisfactory from the men's standpoint in a number of ways. They are very warm in summer and it is difficult to keep the car itself sanitary and comfortable for the men where they are used. The bunks used on some of the prominent eastern roads are double-deck bunks of angle iron construction, standing on four legs and independent of any support from the car except where they rest on the floor. They are furnished in two sizes, 2 ft. 9 in. by 6 ft. 6 in. and 3 ft. by 6 ft. 6 in., and are cheaper than the wooden bunks. They are easily moved when cleaning or scrubbing out the cars, thus

offering little opportunity for the accumulation of dirt and vermin, both of which can be found in many cars when wooden bunks were used.

Diagrams show the types of cars provided for the use of construction and extra gangs and also section laborers. The cars are remodeled at the company shops and the interiors are sealed and painted. The majority of the carpenters and concrete gang laborers who are required to be away from home are furnished with remodeled coaches, in which the interior is disturbed as little as possible when rebuilding them. These coaches are superior to the converted box cars.



LAYOUTS FOR CAMP CARS

All cars and buildings for housing men are kept absolutely sanitary, frequent inspections being made by the officer responsible for their condition. In the majority of cases the food used by the men in the cars is purchased by them from labor agents, but in some instances the cooks buy the food wherever they can purchase it the cheapest, each man paying an equal share. All of the help, such as cooks, waiter and watchmen, are supplied by the railroad. The company also furnishes equipment such as kitchen utensils, brooms, mops, blankets, mattresses, etc. Each gang is furnished with garbage cans, the contents of which is disposed of each day.

The cars are always placed on sidings where no unsanitary conditions exist, due consideration being given to having them placed where a sufficient quantity of water can be secured. The company furnishes ice boxes and supplies the camp with ice during the summer months. In some cases where large gangs are employed permanently the company provides the buildings with running hot and cold water, shower baths, etc.

Better results are obtained from men under these improved living conditions. They are more contented and there are fewer changes in gangs, which is conclusive evidence that comfortable and sanitary surroundings exert a great influence on men.

On some divisions where trains are frequent, such as on suburban lines leading to a large city, it is sometimes possible and practical to employ men living in the city and to send them home each night. This may also be done where a work train goes in each evening, provided there is not too great a loss of time. In most cases, however, it is necessary for men to stay out near the work during the week, allowing those having families to go home every Saturday night unless they are obliged to work on Sunday. There should, however, be a positive reason for doing any work on Sundays, for the foreman or trackman who does six days' work in succession needs the seventh for rest. Any man who has been a close observer in this matter will corroborate this statement. However, the majority of men in extra and construction gangs make their homes in boarding cars and camps and these homes should be made as attractive and sanitary as possible.

Since the conservation of labor and the best means of obtaining and retaining men in service have become such important problems in the present national crisis, it is important that our efforts be directed to a closer study of the problems affecting the labor market and that every method and means at the command of the railroads be made available for present demands when the responsibilities are increasing and the results of each industry has a more direct bearing upon the welfare and combined demands of the whole.

PUBLIC HEALTH REGULATIONS

The state commissioner of health of the state of Washington has prepared a set of rules and regulations governing sanitary conditions in industrial camps in that state. While similar regulations have been adopted in other states, the Washington rules are printed below because of the general interest in this subject at the present time:

WASHINGTON RULES AND REGULATIONS

1. Hereafter contractors and all other persons who may establish an industrial camp or camps for the purpose of logging or any like industry or for the purpose of constructing any road, railroad or irrigation canal, or other work requiring the maintenance of camps for men engaged in such work, or any other temporary or permanent industrial camps of whatsoever nature, shall report to the state commissioner of health so as to maintain good sanitary conditions, and shall at all times keep such camp or camps in a sanitary condition satisfactory to the state commissioner of health.

2. The health officer of each county shall report to the state commissioner of health on the location and sanitary condition of all industrial or construction camps within his jurisdiction in the month of June each year, and at such other times as the commissioner of health may require.

3. All contractors and other persons responsible for the control and management and construction of industrial camps must use all reasonable precautions to protect the men in their employ from disease, and to that end they shall comply with the following regulations adopted by the state board of health.

4. The following are the instructions and recommendations relative to the proper sanitation of camps. The natural topography of the land where camps must of necessity be located renders it impossible to specify in detail complete plans for temporary camps, but the management of camps will be held strictly responsible for failure or refusal to comply with the general intent and spirit of these regulations.

(a) Camps must be established upon dry, well-drained ground.

(b) All natural sink holes or collections of pools of water must be drained and filled when the camp is first established.

(c) The stable and kitchen must be separated by a

distance as great as consistent with the natural topography of the land upon which the camp is located.

(d) The toilets must be located convenient to the bunk houses, and as far removed from the kitchen and eating house as may be practicable.

(e) The use of toilets provided for the men must be made obligatory, and instant discharge of any employee polluting the soil in the camp must be rigidly enforced.

(f) In camps of 100 or over there must be one employee whose principal duty shall be to act as scavenger and garbage collector.

(g) All manure from the barns must be collected and burned at least once in each week. Instead of burning, the manure may be used as fertilizer on fields not less than one-half mile from camp.

(h) All toilets in the camp must be fly-proof. (The state board of health will furnish drawings of inexpensive fly-proof toilets upon request.)

(i) The kitchen and eating house must be effectively screened against flies.

(j) Garbage must be collected in tight cans and burned or buried daily. Garbage may be fed to pigs provided the pen is located not less than 100 ft. from the cook or eating house and kept in a sanitary condition.

(k) Tin cans and other non-inflammable refuse must be collected daily and burned over every ten days or buried in a pit.

(l) Food supplies must be carefully screened and thorough and systematic scrubbing of kitchen, eating houses and bunk houses must be observed.

(m) The supply of water for the camp must come from an absolutely uncontaminated source.

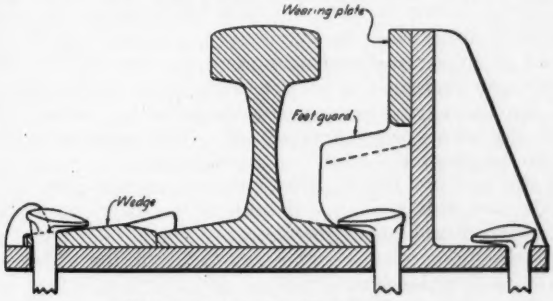
(n) Care must be taken not to pollute the water supply of another camp or the water supply of any of the people of the State of Washington.

(o) All sick from whatever cause should be isolated from the remainder of the crew immediately.

(p) All persons engaged in the care of the premises and handling of the food, particularly cooks and helpers, should be carefully examined and particular attention paid to the point as to whether or not they have suffered from typhoid fever within recent years.

A NEW GUARD RAIL

A CAST IRON guard rail has recently been introduced that embodies a number of new features, including a wearing plate of special annealed steel that can be reversed or replaced when worn out in service.



SECTION OF THE GUARD RAIL

It consists of three parts and is secured in place with no other fastenings than track spikes.

From the cross section and the photograph showing the guard rail as applied in track, it is seen that it consists of a main body casting, the wearing plate and an adjustment key. The body has a length sufficient to extend over three ties, each of which is covered by an extended flange which serves as a tie plate for the running rail. Track spikes driven through holes in these plates secure both the running and the guard rails in position. The guiding flange of the guard rail is curved to give the required flare and is recessed for about three-quarters of its length to receive a special hardened wearing plate held in place by two bolts. This plate

THE GUARD RAIL IN TRACK

receives all of the wear from the wheel flanges and can be replaced or reversed whenever the wear becomes excessive.

Aside from the security afforded by the track spikes the relative positions of the running and guard rails are fixed by means of a key wedged between the edge of the rail base on the side opposite the flange way and two lugs on the end of the middle base plate. After this key has been driven home it is secured by driving a track spike through a slot provided in the side of the key.

Another feature of this guard rail is the incorporation of a foot guard in the body portion in the form of a horizontal flange extending inward from the bottom of the guard flange, which it stiffens effectively, in addition to the service it performs as a safety device. Compared with the usual forms of guard rails this one is relatively light and has been put into place by one man. The guard rails are manufactured by the National Steel Products Company, Ensley, Ala., and are in use in tracks about the plants of the Tennessee Coal & Iron Company.

TRACK MATERIAL STATISTICS

THE American Iron and Steel Institute recently issued a bulletin giving the production of iron and steel in Canada during 1916. This shows a material reduction in the output of steel rails, which amounted to only 81,497 tons. As shown in the table below, there has been a steady reduction from year to year since 1913, when Canada produced its maximum output of 506,709 tons of rails:

PRODUCTION OF RAILS IN CANADA

Year	1912	1913	1914	1915	1916
Tons	423,885	506,709	382,344	209,752	81,497

Of the total for 1916, 7,591 tons weighed 100 lb. per yd. or over, 56,800 tons weighed 85 lb. but less than 100 lb., and the rest weighed less than 85 lb. per yd. The angle bars, tie plates and other rail joints and fastenings produced in Canada in 1916 amounted to 6,479 gross tons as compared with 9,406 tons in 1915, 34,165 tons in 1914, and 54,839 tons in 1913. Statistics from the same source gave the production of angle bars in the United States for 1916 as 162,702 tons, as against 119,659 tons for 1915.

SOME HINTS ON THE LAYING OF RAILS

Suggestions for Conducting the Work and Precautions to Prevent Injury to the Men or the Rails

BY P. H. HAMILTON,
Safety Inspector, Maintenance of Way Department, St. Louis-San Francisco, Springfield, Mo.

RAIL laying can be conducted most efficiently by gangs organized permanently for this work. Rail laying is routine work, and men engaged at it improve steadily with increased experience. The foreman of such a gang has an excellent opportunity to study his work and improve his organization so he can gradually increase the output of the gang. For this reason it will generally be found to be the best policy to arrange to lay rail according to a schedule that will enable a permanent gang to move from one division to another. It may be necessary to suspend winter operations on some roads, but on many it will be possible to work the gangs in southern territory during the winter months and use them in the North during the summer. It is also expedient under some circumstances to organize temporary local gangs to get the rail laid in the shortest possible time, even though the cost of the work under this system will be greater than with permanent gangs.

The economy with which rail laying may be carried on is affected by a number of physical conditions, some of which may be modified to expedite the work. The conditions which must ordinarily be accepted as unalterable are the location, the weather conditions, the alinement, the condition of the roadbed, and ordinarily the class of labor. Conditions which are more or less under the control of those in charge of the work include the manner of distributing the material, the condition of the tools and to a certain extent the spacing of trains. It is frequently found possible to rearrange the schedules of some freight trains temporarily to create a minimum interference with the steel gang.

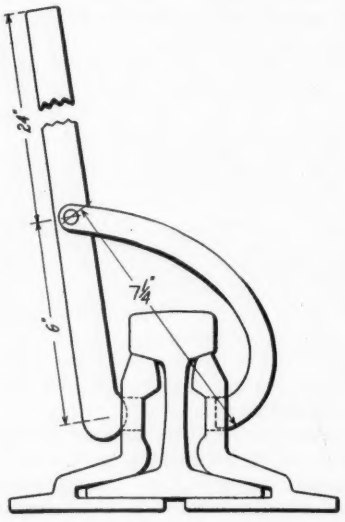
DISTRIBUTION OF MATERIAL

The proper distribution of the material is one of the most important items to be considered. This work is frequently left to section foremen who possibly have never had any steel gang experience. In consequence it is very important to issue some form of instruction which will serve as a guide to these inexperienced men in unloading the material in such a way as to assist the steel gang as much as possible. Rules are very easily devised whereby the correct quantities of tie plates, spikes, tie plugs, nut locks, rail joints, etc., may be distributed with reference to telegraph poles, rail lengths or other guides.

It is also essential that the materials be in proper condition for use when the gang arrives. Bolts and nuts should be unloaded at stations where they can be placed under shelter to preserve the oiling until needed. Frog, switch and guard rail fastenings should be oiled as soon as unloaded and in case of any unusual delay in making use of them they should be re-oiled whenever necessary until placed in the track.

The unloading of the new rails should be done with great care to avoid possibility of injury to them. The rolling of rails off the sides of cars is particularly objectionable and, aside from the chance of breaking or bending them, it may be the cause of much extra work in cases where the roadbed is narrow in pulling back rails which have rolled down the embankment. The best solution is to use a rail unloading machine, but where one is not available the rails should be pulled from the ends of the cars. When loaded in wooden gondola cars this plan may be followed by removing one or two planks from the ends of the cars without otherwise mutilating them.

Unloading by this method is accomplished by pulling the car out from under the rail, two rails being unloaded at the same time, one for each side of the track. While the car moves away the rails are held back by means of ropes especially prepared for this purpose with a hook at one end to pass through a bolt hole in the rail end and a clamp on the other end to take a hitch to the track at a rail joint. Hemp rope should always be used for unloading rails, a one-inch rope serving very well for this purpose. Steel ropes are langerous because of the opportunity for breaking them in case a rail becomes fast in the car. After a car has been unloaded in this manner it should be cut loose from the train and left standing on the main line while the next car is being unloaded. Each time that a car is emptied the train should back up to the cars previously unloaded and bring them forward to the point of commencing the unloading of the next car. In this way the distance between the loaded and empty cars will never exceed about 1,800 ft.



RAIL JOINT CLAMP

The rails may be placed outside the track rails at the ends of the cross ties by using a V-shaped guide of steel or timber fastened over the draw bar and extending down over the tracks. The rails in the bottom layer in the car have a tendency to catch on the bottom of the car while being dragged off. This may be overcome by placing a sheet iron hood or guide on the floor of the car and pinching the rails up so that they will slide over this guide. On bridges the rails should be draged off and placed between the track rails and the outside guard rail. There is practically no hazard from rails in this position.

When relaying rails on curves precautions should be taken to prevent the curving and unloading of rails throughout the length of the spirals which have been curved to the same ordinate as that required for the central curve. The rails for the spirals should be curved to fit the spirals as nearly correctly as possible except for very light curvature where a straight rail should be used. The bending of rails for curves is frequently facilitated by having the curve carefully relined

with the old rail still in place and then curving the new rail from measurements taken on the track.

The Rail Laying Machine

In selecting a rail laying machine the decision for the use of either a heavy or light machine must be governed by the opportunity afforded for setting off the machine readily to pass trains as determined by the width of the embankment and frequency of road crossings. Any rail laying machine will greatly increase the efficiency of the steel gang. It not only takes the place of from 8 to 18 men, but sets the pace for the other men employed. The adz and crow-bar men must hurry to keep ahead of it and the bolters and spikers must make strenuous efforts to keep up with it. While the light car has the advantage that it may be easily set off to clear trains, the heavy gasoline power machine is of more value because it can be used to carry the men to and from the work and can also serve to load and unload rails.

When using one of these machines for laying rails it is always well to carry two or more emergency rails with extra bolts, spikes and nut locks on the sides of the machine, this extra material being unloaded or distributed whenever required. The connection rails, connection tools, extra spikes, bolts and track wrenches are best carried on a trailer, so that whenever a connection is made, the claw bar and adz men who turn back to spike and bolt while the connection is being made will find the additional material handy.

A gasoline power rail laying machine placed on top of a train of flat cars will load relay rail more efficiently than any air loader, owing to the fact that it can move back and forth across the flat cars with its own power and it is not necessary to move the flat cars while the loading is taking place. It is true that these unloaders must be guyed while raising a load, by means of lines running from the corners of the machine to the stake pockets of the cars, but this hitch can be made in a moment and does not cause any material delay. Another auxiliary use has been found for these gasoline machines by equipping them with grinding attachments so that they can be used for sharpening tools.

Tools

The best of tools should be furnished, and good equipment should be maintained. This is especially true of claw bars and adzes. Bars should be furnished with chisel points on one end and these should be ground sharp frequently so that the claw bar man will have little trouble removing the deadwood from around spike heads. Adzes should be kept sharp, and the dull ones exchanged for sharp ones frequently during the day. Track wrenches should be given frequent attention so that the jaws will always fit snugly around the nut. A loose fitting wrench wears off the corners of the nuts, and may cause injury to the wrencher who chances to fall when the wrench slips. The men applying the joints should have wrenches only 12 or 14 in. long, with which they can work rapidly while starting the bolts in the joints. The men following should have wrenches with handles from 30 to 36 in. in length to put the final tension in the bolts. All tools should be gathered up and kept close to the rail laying machine or the tong men, so that when they start to full-spike, while the closure is being made, it will not be necessary to walk back hunting for tools.

As a matter of safety, and also of speed, in taking up the old rail from bridges, the inside line of spikes should be pulled first, the rails cut apart at each end of the bridge, and the old rails lined to the center of the track. The spikes can then be pulled by the claw bar men working in such a position that it would be impossible for any of them to fall from the bridge.

Rails should be placed in track, one at a time, to keep uniform expansion, and the joints should be applied after the rails are in position. When joints have previously been placed on one end of each rail, they generally catch grit or ballast while being handled, with the result that it is hard to get them to fit properly. Two men using a clamp like the one shown in the accompanying sketch can couple up 320 rails per day.

In laying rails where the track is not in first-class surface it is nearly impossible to get accurate gage, for the first train either settles the rail inward or outward, according to the inequalities in the surface of the track, and the gage will be either wide or narrow. In order to overcome this it is necessary to regage the track after the rail has settled to a bearing. Tie plates can be made to fit up snugly if the inside (gage side) spike is always driven home before the outside spike is started.

DITCHING WITH AN AUTO CRANE

THE Pennsylvania Lines West recently let a contract for ditching on the Eastern division, between Pittsburgh, Pa., and Crestline, O., about 180 miles. As the handling of this work by hand was slow and costly as well as impractical in cuts of any height, the contractors decided on the use of an auto-crane which travels under its own power over any grades that an automobile will negotiate. The machine consists of a three-drum hoisting engine mounted on a steel frame that also carries a head frame, mast and boom. The frame is mounted on broad-tired wheels which travel either on the ground or

At Work Along the Track

on planked runways. The machine is self-propelled by means of a chain drive connected to the two wheels at the crane end. For heavy side lifts it can be braced by an inclined outrigger fitted to the top of the head frame and having a jack attached to its foot. Two booms are used, one 18 ft. long for use in light cuts, and the other 28 ft. long for use in heavy cuts. The booms are easily interchanged and are fitted with a narrow ½-yard Owen digging bucket equipped with steel teeth.

Where there is sufficient room, the machine is worked along the foot of the slope, but usually it travels at the top. When moving from a completed cut to a new one,

it ordinarily travels under its own power. In cases where the right of way is very rough, a derrick or wrecking car furnished by the railroad picks up the machine, swings it over the track and carries it to the new cut, placing it in position to resume operations. The machine is not loaded on a car during the transportation.

The organization to carry on the work consists of a hoisting engine runner, a fireman and a team driver and helper. One man spots the bucket in position and two men with mattocks, shovels and a 1½ to 1 slope templet follow the machine to dress up the slope. There is also

SIDE VIEW OF THE MACHINE

a man who levels the waste bank as the material is dumped from the bucket. The ditch is kept to a straight line by the use of a mason's cord, fastened to iron pins set at the proper distance from the rail, while the grade is determined by measuring from the rail.

The coal used by the machine is supplied by the railroad and is dumped in piles ahead of the work. The team driver is supplied with a wagon to transport this coal to the machine and also with a tank wagon to haul water from the nearest stream.

The ditching has already been completed on both sides of the track for about 20 miles of line. The average excavation moved is about 400 cu. yd. per day of 10 hours. Ordinarily the material is deposited along the top of the slope, although it can be loaded on cars if so desired.

This work is being done under the direction of E. B. Taylor, Jr., division engineer of the Eastern division, and E. G. Johnston, assistant division engineer. It is being handled for the railroad by Laidlaw Brothers, general contractors, Pittsburgh, Pa. The auto-crane used was manufactured by the John S. Byers Machine Company, Ravena, Ohio.

INCREASING THE CAR LOAD.—A vigorous campaign to secure more effective utilization of freight cars is being conducted by the Pennsylvania system. Since shippers of l. c. l. freight usually make up the lightest carloads, special attention has been given to this class of freight. The results on the Pennsylvania Lines West of Pittsburgh for the month of March, 1917, show an increase of 12.6 per cent in the average tons per car forwarded over March, 1916. While the total tonnage of l. c. l. freight was 2.6 per cent greater in 1917 than in 1916, the total number of cars used was 9.2 per cent less. The campaign to save cars has not been confined to the Pennsylvania Lines West of Pittsburgh, but has also been carried on by the Pennsylvania Railroad, as evidenced by the fact that it has lately shown an average load per car nearly three tons greater than for the same month of the preceding year, which was equivalent to a saving of 2,018 cars per day.

THE MATERIAL MARKET

THE intense excitement prevailing in the steel market a month ago has largely subsided. Extreme prices have driven many purchasers out of the market, while the prospects of a government fixing of prices is causing others to hold off for further developments. Prices are still tending upwards, but it is believed that the prevailing shortage of material will not be permitted to serve further as an excuse for unreasonable prices on purchases necessary, directly or indirectly, for the conduct of the war. Reductions in the demand for metals through the placing of embargoes on shipments to neutral nations and prohibition of the use of steel where its application can be avoided as urged by the United States Chamber of Commerce, will undoubtedly be of some benefit in extending the supply of this material for those lines in which its use is most urgent.

Government orders are beginning to have a definite influence in some lines. Nails, for instance, which are required in great quantities for the construction of the cantonments, are becoming scarce. They are now quoted at $4 per 100 lb. keg, an advance of $0.50 in the month. A similar situation holds as to structural steel. The government is the most important purchaser, and with the small number of private contracts, each of which is a law unto itself, prices cannot be quoted with any degree of accuracy. Railroads have placed but a very limited number of orders in recent weeks.

Most track fastenings are priced higher than they were a month ago. Track spikes bring $4.75 at Pittsburgh, and $4.25 at Chicago, per 100 lb. A definite scarcity is becoming manifest. One manufacturer is now out of the market, and some other plants are working to less than capacity because of the shortage of plain materials. Track bolts are $5.60 at Pittsburgh and $5.25 at Chicago, per 100 lb. Tie plates have advanced to $70 and cents per lb. The Pennsylvania Railroad is inquiring for 12,000 kegs of spikes for delivery this year.

The one redeeming feature, from the standpoint of the railways, is the continued high price of scrap. Although purchasers are anxious to see a falling off in the price, there have been only minor declines in few items. Scrap rail is selling at from $43 to $48, while rails suitable for relaying are bringing $45 to $60 per gross ton. The market for new rails is still practically closed, although the price remains nominally $38 to $40 per gross ton, but only a few rails are being sold to the roads at the present time. An order was recently placed for 350 tons of 60-lb. and 70-lb. rails for use in terminal development for the cantonment at Des Moines, Iowa. France wants portable track material, including 30,000 tons of light rail.

Cast iron pipe has experienced another $5 raise, so that it is now $65.50 for 6 in. diameter or larger, as compared to $60.50 a month ago and $55.50 two months ago. Like wrought pipe, it is becoming scarce, this being one reason why wooden stave pipe is being used extensively in water service developments at the army camps. Sanitary installations at these points have also effected a scarcity of certain grades of plumbing fixtures which are being used in great quantities.

In lines of materials other than the metals the outlook for the purchaser is much brighter. The marked improvement in the car situation is an important factor in this regard, particularly in the lumber market. The movement of this material has been expedited appreciably and prices are easier in some quarters. It is now generally believed that the Government's need for lumber will not exert a serious drain on the supply.

GENERAL NEWS DEPARTMENT

THE LOUISVILLE & NASHVILLE has increased the pay of large numbers of clerical and other employees, including telegraphers and bridge carpenters.

THE CHICAGO GREAT WESTERN employees recently collected $1,640 to provide greater comforts for the men of the Great Western company in the Third Reserve Engineers.

THE LIBERTY LOAN COMMITTEE OF RAILROADS in a recent report to the roads participating in the loan advises that the railways' campaign resulted in 241,280 subscribers, with a total of $20,027,966 in bonds.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS on June 15 made an advance of 10 per cent in the pay of all of its employees, except general officers, who had not recently received advances. About 4,000 persons were affected.

THE ATCHISON, TOPEKA & SANTA FE, because of the shortage of draftsmen to fill vacancies caused by the war, has employed 12 girls in the drafting room of the construction department at Chicago. If the experiement proves a success more will be employed as occasion demands.

THE PENNSYLVANIA RAILROAD adopted green lights in place of white lights for the "night proceed" indications in semaphore signals, and yellow in place of green for "caution" on all lines east of Pittsburgh on June 23. Corresponding changes in train marker lights, switch lamps, at slow signs, etc., were also made.

FAIRFAX HARRISON, chairman of the Railroad War Board, issued a statement to the effect that the railroads of the country report the elimination of passenger trains aggregating 16,267,028 miles of train service per year, as part of their effort to make available a maximum of transportation for the movement of freight.

THE DENVER & RIO GRANDE lost 18 miles of its double track main line between Helper, Utah, and Colton, and a branch line extending south 21 miles from Colton on June 25, following the failure of an irrigation dam near Price, Utah. The main line was washed out in 14 places in those 18 miles and was out of service nine days.

THE CENTRAL OF GEORGIA has issued a circular proposing that the law of Georgia forbidding the movement of freight on Sunday be suspended for the period of the war. It is pointed out in this circular that under the provisions now existing the movement of freight traffic in Georgia is 10 per cent less efficient than in other states and would be 14 per cent less efficient except that the law permits the movement of perishable freight.

THE CONNECTICUT LEGISLATURE has passed a law requiring all cities, towns and boroughs in that state to maintain cautionary signs approaching railroad grade crossings—at a distance of 300 ft. to 500 ft.—the signs, however, to be furnished by the railroad company. "Stop" crossings may also be required, where self-propelled vehicles must be brought to a stop before passing over the tracks; and at such crossings the commission may require the railroad company to erect and maintain signs within the limits of its right of way.

PRESIDENT WILSON probably will soon have the opportunity to appoint two additional members to the Interstate Commerce Commission in addition to a successor to the late Judson C. Clements. A number of names are being urged upon him for consideration, including Max Thelen, president of the California State Commission; J. F. Shaughnessy of the Nevada commission; Edgar J. Watkins, examining attorney for the Interstate Commerce Commission, and Frank McManamy, chief inspector of locomotive boilers of the Commission.

THE CHICAGO & NORTH WESTERN, through its central safety committee, R. C. Richards, chairman, has issued a safety bulletin appealing to employees not to take chances by violating safety regulations. The circular says in part: "Get after the chance-takers and teach them to be careful or drive them out of the service before, and not after, some one is killed or injured. It may be you. During the six years ending December 31, 1916, 85 per cent of the deaths and injuries to North Western men were caused by dangerous or thoughtless practices."

THE PENNSYLVANIA RAILROAD on June 1 placed 60 men on the "Roll of Honor," among whom were 6 who had served this railroad for over 50 years and 23 who had been employed for over 40 years. Among the oldest employees in this list in point of service was Thomas Murray, track foreman on the Tyrone division, who began railway work as a track laborer at Milesburg, Pa., on August 20, 1864, and who has been a track foreman since April 15, 1871. In all his service Mr. Murray has never been disciplined for dereliction of duty.

ELISHA LEE, general manager of the Pennsylvania Railroad, has sent to each employee of the road a leaflet on the subject of the pass privilege, in which he cautions employees to be careful in observing their courteous obligation not to occupy seats when pay passengers are standing. He calls attention to the fact that occupancy of a seat by a pay passenger is a *right*, while in the case of the holder of a pass it is a *privilege*. Attention is called to the fact that under war conditions trains will at times unavoidably be crowded and that it may not always be possible to give every passenger a seat.

THE CAR SHORTAGE, according to a statement issued by the railway war board, had been reduced to 77,144 on June 30, a decrease of nearly one-half from the total of 148,627 on May 1. Reports just compiled by the war board also show that the railroads, in their co-operative effort to realize the maximum of transportation efficiency, have already effected an extraordinary improvement in the amount of coal handled. Reports to the Geological Survey, just available, show that in June the railroads of the country hauled 750,323 cars of bituminous coal—an increase of 26.2 per cent over June last year.

THE FEDERAL VALUATION WORK may be discontinued soon, according to Mr. Adamson, chairman of the committee on Interstate and Foreign Commerce of the House of Representatives, who said recently in discussion in the House that he did not think Congress would continue to appropriate money for this purpose during the war and that the work would probably be entirely suspended. At the office of the Interstate Commerce Commission it was stated that the Commission did not have authority to discontinue this work without instructions from Congress, and it knows of no intention to abandon the work.

THE INTERSTATE COMMERCE COMMISSION handed down a decision on June 29 denying the general 15 per cent advance of rates asked by the railroads of the country, but permitting increases on coal, coke and ore, in class rates in official classification territory and in water and rail rates. The Western roads were allowed to file tariffs increasing rates in coal and coke not to exceed 15 cents per ton. Commissioner Harlan filed a concurring opinion, but expressed the belief that the relief granted is not adequate and that some general increases should have been allowed. Commissioner Meyer dissented from the conclusion that the eastern carriers required an increase in rates, while Commissioner McChord concurred in this opinion, on the ground that the facts should be presented before Congress for determination as to whether prices for fuel and supplies should not be regulated rather than the rates being increased.

THE PENNSYLVANIA RAILROAD has established a special bureau for the purpose of looking after the welfare of its enlisted employees. Any employee of the road who responds to the call to arms is granted a furlough for such time as he may be engaged in the state or national military or naval service. He is also allowed to retain the same privileges of free transportation to which he was entitled when engaged in the active service of the railroad, while credit will be given for the time engaged in military service in computing pension allowances. The advisory committee of the Voluntary Relief Department of the railroad has also arranged that furloughed employees in military and naval service may continue their membership in the relief fund upon payment of the usual contributions and in case of disability they will be entitled to its benefits.

PERSONAL MENTION

GENERAL

E. F. KULTCHAR, roadmaster on the Ottumwa division of the Chicago, Burlington & Quincy, with headquarters at Osceola, Ia., has been promoted to the position of trainmaster on the La Crosse division, with headquarters at La Crosse, Wis.

W. A. COWAN, division engineer of the Transcontinental division of the Canadian Government Railways, with headquarters at Cochrane, Ont., has been appointed general superintendent, with the same headquarters, succeeding F. P. Brady, promoted.

ROBERT VALENTINE MASSEY, who has been appointed general superintendent of the Eastern Pennsylvania division of the Pennsylvania Railroad, with headquarters at Altoona, Pa., entered the service of the Pennsylvania Railroad in the construction department, and remained in that department until August, 1895, when he was transferred to the maintenance of way department. He was appointed assistant supervisor on November 1, 1895, was promoted to supervisor and in April, 1907, he was advanced to division engineer. On March 7, 1911, he was promoted to superintendent, serving in various divisions until his recent appointment.

ENGINEERING

O. H. MANN has been appointed engineer maintenance of way of the Northern division of the Chicago Great Western, with headquarters at St. Paul, Minn., succeeding W. J. Calvin, resigned.

J. F. DEIMLING, assistant chief engineer of the Michigan Central, has been appointed acting chief engineer, with headquarters at Detroit, Mich., effective July 11, vice George H. Webb recently commissioned a lieutenant-colonel in the Sixth Reserve Engineers.

G. C. JEFFERIES, roadmaster on the Atchison, Topeka & Santa Fe at Plainview, Tex., has been appointed division engineer, with headquarters at Clovis, N. M., succeeding C. B. Clegg, who has been appointed supervisor of water service on Western Lines, with headquarters in Amarillo, Tex.

N. C. VAN NATTA, valuation engineer of the Evansville & Indiana, with headquarters at Terre Haute, Ind., has been appointed chief engineer of the Missouri, Oklahoma & Gulf, with headquarters at Muskogee, Okla., in charge of engineering and maintenance of way, succeeding J. W. Dawson, resigned.

P. A. BEATTY, assistant engineer maintenance of way for the Baltimore & Ohio at Baltimore, Md., has been promoted to division engineer maintenance of way with headquarters at Wheeling, W. Va., succeeding E. H. Barnhart, transferred to Baltimore as division engineer, succeeding Richard Brooke, resigned, to enter military service.

E. R. KIDDER, formerly supervisor of bridges and buildings on the Oregon-Washington Railroad & Navigation Company at Portland, has been appointed division engineer, with headquarters at Walla Walla, Wash., to supersede M. C. Williams, who has been transferred to Portland, vice T. W. Saul, resigned, to become an officer in the Eighth Railway Regiment, as noted elsewhere.

H. C. NELSON, draftsman in the district engineer's office of the Canadian Pacific at North Bay, Ont., has been appointed resident engineer, with headquarters at Chapleau, succeeding A. O. Wolff, transferred. W. L. Codington, resident engineer at Revelstoke, B. C., has been appointed resident engineer, with headquarters at Vancouver, succeeding T. E. Price, granted leave of absence for military service.

H. T. RUHL, who has been appointed engineer maintenance of way and structures of the Delaware & Hudson, with headquarters at Albany, N. Y., as has already been announced in these columns, began railway work in 1902 as a rodman on the Canadian Pacific. From 1904 to 1905 he was transitman, and then to 1908 was resident engineer at Toronto, Ont. In 1908 he was appointed senior transitman at North Bay; the following year he became resident engineer at Sudbury, and from 1911 to 1913 was resident engineer at Farnham on the same road. He left the service of the Canadian Pacific in 1913 to become resident engineer on the Canadian Government Railways, at New Glasgow, and in 1915 was promoted to division engineer at Moncton, N. B., which position he held at the time of his recent appointment as engineer maintenance of way and structures of the Delaware & Hudson.

J. C. BECKWITH, engineer of construction on the Canadian Government Railways, has been appointed division engineer, with headquarters at Moncton, N. B., succeeding H. G. Ruhl, resigned, to accept service with another company. A. V. Redmond, resident engineer, with headquarters at Cochrane, Ont., has been appointed division engineer, with the same headquarters, succeeding W. A. Cowan, promoted. A. H. Willett, assistant division engineer of the Transcontinental division at Cochrane, has been appointed resident engineer, with the same headquarters, succeeding Mr. Redmond.

R. H. SMITH, roadmaster on the Norfolk & Western at Roanoke, Va., with supervision over the line between Roanoke and Bluefield, has been appointed assistant superintendent of the Pocahontas division, in charge of maintenance of way and structures, with headquarters at Bluefield, W. Va., effective June 19, succeeding L. C. Ayers, who was transferred to the Norfolk division, with headquarters at Crewe, Va., as previously noted. Mr. Smith was born at Baltimore, Md., on March 10, 1888, and received his education at Princeton University. He entered railway service on June 25, 1910, in the engineering department of the Norfolk & Western. On June 1, 1913, he was promoted to a position in the operating department and later became assistant roadmaster, which position he held until his appointment as roadmaster at Roanoke, Va..

F. B. TAPLEY, assistant engineer of the Canadian Government Railways at Moncton, N. B., has been appointed assistant engineer of maintenance, with headquarters at the same place, reporting to the chief engineer. Mr. Tapley began railway work in 1903 with the Canadian Pacific Railway as rodman and later served consecutively as transitman, resident engineer, and assistant engineer with the engineer of maintenance of way and in the general manager's office at Montreal, Que. In July, 1916, he resigned from the service of the Canadian Pacific to become assistant engineer in the office of the chief engineer of the Canadian Railways at Moncton, N. B., which position he held until his appointment as assistant engineer of maintenance, all lines. This position was recently created in connection with a reorganization of the engineering department.

TRACK

THOMAS MANEY, general roadmaster of the Louisville & Nashville, with headquarters at Louisville, Ky., has resigned to give his attention to the promotion of track devices which he has developed.

W. F. RENCH, supervisor on the Pennsylvania Railroad, with headquarters at Perryville, Md., resigned on July 1, to become superintendent on construction for the James McGraw Company, contractors for the Phillipsburg, N. J., cantonment.

W. G. DUNGAN, superintendent of the Sterling division of the Chicago, Burlington & Quincy, Sterling, Colo., has been appointed roadmaster and trainmaster on the Orleans to St. Francis and Republic to Oberlin branches of the McCook division, with headquarters at Orleans, Neb., succeeding D. E. Lynch, who has been transferred to McCook, Neb., with supervision over the lines between McCook and Akron, and between Culbertson and Imperial, in place of A. Carlson, assigned to other duties.

G. H. B. ENGLISH, supervisor on the Philadelphia, Baltimore & Washington, with headquarters at Wilmington, Del., has been transferred to the main line of the Pennsylvania railroad, with headquarters at Lancaster, Pa., succeeding S. L. Church, promoted. Porter Allen, on the Pennsylvania, with office at Olean, N. Y., has been transferred to Norristown, Pa., succeeding S. H. Kuhn, transferred. S. E. Zullinger, assistant supervisor at East Greensburg, Pa., has been promoted to supervisor at Barnesboro, Pa., succeeding J. D. Archbald, transferred. R. A. Stough-

ton has been appointed assistant supervisor at Tyrone, Pa., succeeding S. E. Stewart, transferred, and E. B. Callow has been appointed assistant supervisor at Middletown, Pa., succeeding L. R. Fleming, transferred.

W. L. SHANKS, track supervisor on the Boston & Maine at Rochester, N. H., has been transferred to Portsmouth, N. H., succeeding C. W. Lewis, who has been granted a leave of absence to enter military service. D. J. Morrison succeeds Mr. Shanks at Rochester.

J. M. FARROW has been appointed roadmaster on the Norfolk & Western, with headquarters at South Boston, Va., and with jurisdiction over the lines between Lynchburg and Durham, succeeding J. R. Cralle, transferred to Shenandoah, Va., in charge of track between Hagerstown, Md., and Island Ford, Va. Mr. Cralle succeeds J. H. English, who has been transferred to Roanoke, Va., with jurisdiction over the line between Roanoke and Bluefield, in place of R. H. Smith, promoted, effective June 19.

JAMES A. LOWRY, section and extra gang foreman at Chillicothe, Ia., has been appointed roadmaster on the Chicago, Burlington & Quincy, with headquarters at Osceola, Ia., succeeding E. F. Kultchar, promoted. He was born at Lockridge on October 14, 1877, and entered railway service with the Chicago, Burlington & Quincy as a section laborer in 1894. In 1898 he became a section foreman at Chillicothe and had charge of a section in the winter and a steel gang in the summer, in which positions he served until his recent appointment on June 10.

JOHN W. BLADOCK, who has been appointed roadmaster on the Chicago, Rock Island & Pacific, with headquarters at El Reno, Okla., was born on July 22, 1885. He entered railway service on September 2, 1901, as a section laborer on the Chicago, Rock Island & Pacific, and on August 1, 1905, became section foreman. From October 5, 1913, to May 28, 1916, he was yard foreman and on the latter date was promoted to ballast inspector and pit foreman. On November 10, 1916, he was appointed fence gang foreman and on January 24, 1917, he became rail saw foreman, which position he held until his appointment as acting roadmaster at El Reno on May 4, 1917. On July 4, 1917, he was promoted to roadmaster as already noted.

LUCIAN THOMPSON WALLIN, whose appointment as roadmaster on the Panhandle & Santa Fe at Plainview, Tex., was announced in these columns last month, was born at Conway, Mo., on May 21, 1872. He entered railway service with the St. Louis & San Francisco in 1887, as a laborer and was later promoted to section foreman. From 1897 to 1902 he was extra gang foreman on the Illinois Central and from the latter date until 1909 worked as extra gang foreman and general foreman of construction for various roads, including the Houston & Texas Central, the Chicago, Rock Island & Pacific, the St. Louis, Kansas City & Colorado and the Mexico lines of the Southern Pacific. In 1909 he became extra gang foreman on the Pan Handle & Santa Fe, which position he held until his recent appointment as roadmaster.

D. J. MORRISON, assistant track supervisor on the first district of the Southern division of the Boston & Maine, with headquarters at Lowell, Mass., has been appointed track supervisor on the fourth district of the Portland division, with headquarters at Rochester, N. H. Mr. Morrison was born in Nova Scotia in January, 1874, and began railroad work as a section laborer at Lowell, Mass., in May, 1893. In March, 1896, he was appointed section foreman at Haggetts, Mass., and extra gang foreman at Lowell, Mass., in December, 1899. In April, 1908, he was transferred to Ware, Mass. On January 1, 1913, he was appointed track supervisor, with headquarters at Lowell, Mass., serving in this capacity until May of the same year when he returned to Ware as extra gang foreman, serving in this capacity until receiving his appointment as assistant track supervisor at Lowell.

BRIDGE

E. S. GIBSON has been appointed supervisor of bridges and buildings on the Third division of the Denver & Rio Grande, with headquarters at Gunnison, Colo. This is a new position, as this division was formerly under the jurisdiction of M. J. Kerndt, supervisor of bridges and buildings at Salida, Colo., who had charge of both the second and third divisions.

A. I. GAUTHIER, supervisor of bridges and buildings for the Boston & Maine at Concord, N. H., has been granted a military leave of absence and S. E. Dufort has been appointed to succeed him.

DAVID W. SHARP, bridge and building supervisor on the New York, New Haven & Hartford, with headquarters at New Haven, Conn., has been retired on a pension on his own request after a continuous service of 46 years with the company.

J. DONALD has been made supervisor of bridges and buildings on the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, having charge of the entire division, thereby eliminating this position at Cosmopolis.

PURCHASING

J. L. FEEMSTER, storekeeper of the Kansas City Terminal Railway at Kansas City, Mo., has been appointed general storekeeper on the Chicago Great Western, with headquarters at Oelwein, Ia.

A. W. MUNSTER, general storekeeper of the Boston & Maine, with headquarters at Boston, Mass., was appointed purchasing agent on July 1, succeeding B. S. Hinckley, resigned. He was born on July 24, 1882, at Waltham, Mass., and was educated in the Massachusetts Institute of Technology. He began railway work with the Northern Pacific in 1904, serving as a machinist and material inspector. In 1909 he went to the New York, New Haven & Hartford as a material inspector and subsequently served as chief inspector and engineer of tests. In 1911 he went to the Boston & Maine as general storekeeper.

IN MILITARY SERVICE

D. A. TOMLINSON, assistant engineer of the Chicago & Western Indiana, Chicago, has been commissioned second lieutenant of Company A, First Engineers, Illinois National Guard.

B. C. ALLIN, employed on special bridge work by the Chicago, Rock Island & Pacific, has been commissioned captain and is assigned to Company B, First Engineers, Illinois National Guard.

L. J. HUGHES, assistant to chief engineer and formerly division engineer of the Chicago, Rock Island & Pacific at Herington, Kan., is first lieutenant of Company B, First Engineers, Illinois National Guard.

MILTON J. WHITSON, representative of the Grant, Smith Company at Seattle, Wash., has been appointed construction manager in the quartermasters' department of the United States army for the building of cantonments.

RICHARD BROOKE, assistant engineer maintenance of way on the Baltimore & Ohio at Baltimore, Md., has received a commission as captain in the Engineers' Officers Reserve Corps, and has been assigned to duties with the Fifth Engineers at Pittsburgh, Pa.

THOMAS W. SAUL, division engineer of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore., was recently made a first lieutenant in the Eighth Regiment of Engineers, United States army, and is now in training at American Lake, Wash.

C. W. LEWIS, track supervisor of the Portland division of the Boston & Maine at Portsmouth, N. H., has received a commission as captain in the United States army and has been assigned to Company A (Boston & Maine contingent), First Battalion, Fourth Reserve Engineers, with temporary headquarters at Camp Rockingham, Salem, N. H.

H. T. DOUGLAS, JR., chief engineer of the Chicago & Alton, has received a commission as major in the Officers' Reserve Corps. R. A. Cook, valuation engineer, and J. W. Reid, bridge engineer, have each received commissions as captain. P. J. Watson, Jr., assistant engineer at Bloomington, Ill., who has been on a leave of absence to attend the Officers' Training Camp, has received a commission as captain and has been assigned to Fort Leavenworth.

CONSTRUCTION NEWS

THE ALABAMA, FLORIDA & SOUTHERN has bought a line running from Cowartz, Ala., southwest to Cottonwood, a distance of 9 miles, and work is now under way on a connection from this line at Cottonwood east to a point on the Alabama, Florida & Southern. A line is also being built from the present southern terminus of the A. F. & S. at Malone, Fla., south to Greenwood, a distance of 6 miles. These new lines will be completed by October 15.

THE ATCHISON, TOPEKA & SANTA FE has awarded a contract to the Cresmer Manufacturing Company, Riverside, Cal., to erect several buildings at its car shops at San Bernardino, which will cost about $60,000. The buildings include a one-story refrigerator car repair shed, 46 ft. by 1,200 ft.; a one-story blacksmith shop, 50 ft. by 385 ft., and a one-story car repair shop, 46 ft. by 310 ft.

This company has also awarded a contract to Maney Bros. & Co., Oklahoma City, Okla., for the grading, bridge work, tracklaying and surfacing, fencing and building required for the construction of the Osage County & Santa Fe from Bowen to Fairfax.

THE BALTIMORE & OHIO, in conjunction with the Cleveland, Akron & Cincinnati, the Akron-Barberton Belt Line and the city of Barberton, Ohio, has completed plans for the construction of a concrete steel viaduct on East Tuscarawas avenue. The structure will cost approximately $206,000, of which amount the railroads will pay 65 per cent and the city and county the balance.

This company is building a five-mile industrial line at Baltimore, Md., which will be known as the Patapsco Neck branch, from a point near Colgate Creek station to a connection with the Sparrow's Point system, reaching the Penn-Mary plant of the Bethlehem Steel Company. The bridge work consists of one structure 1,210 ft. long, made up of a steel draw span 210 ft., with timber trestle approaches 475 and 525 ft., respectively, and a bridge consisting of two steel girders 71 and 80 ft. in length, with a timber trestle. The work is being done by H. S. Kerbaugh, Inc., of Baltimore and New York.

THE CHICAGO, BURLINGTON & QUINCY has awarded a contract to Ralph Sollitt & Son, Chicago, for the construction of a storehouse, oilhouse, machine shop, power house and office building at Clyde, Ill. The buildings will be one-story high, of brick construction, with concrete foundation. A contract has also been awarded to G. A. Johnson & Sons, Chicago, for the building of an extension to the roundhouse at Beardstown, Ill.

THE CHICAGO, MILWAUKEE & ST. PAUL has awarded a contract to the McCarthy Improvement Company, Davenport, Iowa, for the construction of a freight house at that place. The building will be 40 ft. wide and the total length will be 409 ft., of which 79 ft. will be two stories high and the remaining 330 ft. will be one-story high. It will be of reinforced concrete construction and will have a Barrett specification roof. In addition to the building there will be an uncovered concrete platform 319 ft. by 40 ft.

THE CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS has awarded a contract to C. G. Mitchell & Sons, Charleston, Ill., for the erection of a freight house at Middleton, Ohio, which will cost about $40,000. The building will be 22 ft. high, 40 ft. and 80 ft. wide and 290 ft. long, with brick walls, wood trusses and Barrett specification roof.

This company has completed plans for the erection of a passenger station at Charleston, Ill., to replace the building which was destroyed by the recent cyclone. The new building will be a one-story wood structure, 78 ft. by 38 ft., with an additional canopy and express room, 45 ft. by 21 ft.

THE ERIE has awarded a contract to the Robert Grace Contracting Company, Pittsburgh, Pa., for the sub-structures required for new yard tracks between a point two miles west of Marion, Ohio, and a point four miles west. The work involves the realinement of one main track and the building of one 50-ft. single-track bridge; one 50-ft. four-track bridge; one 45-ft. single-track bridge, and one 85-ft. single-track bridge. The work on the super-structures will be carried out by the railroad forces. The total estimated cost of the improvements is $550,000.

THE GRAND TRUNK will start work at once on a new station building at St. Catherines, Ont., and work has already been started on a new station at Berlin, N. H.

THE GULF, COLORADO & SANTA FE in conjunction with the Southern Pacific Lines, the Galveston & Houston (electric) and the county, has awarded a contract to the Larkin & Sangster Company, Buffalo, N. Y., to construct concrete arch extensions on both ends of the present Galveston (Tex.) causeway. The total length of the new construction will be about 5,900 ft. The section of the arches, including the drawbridge, that withstood the storm, is 2,446 ft. long. There will be 51 new arches on the main land end, and 28 new arches on the Galveston end, a total of 79 arches, each having a span of 60 ft. The arches will rest on piers supported by concrete piles driven into clay. The Concrete Steel Engineering Company, New York, which designed the arch portion of the original causeway that weathered the storm successfully, has been retained to design the extensions. The total cost of the work is not to exceed $1,725,000.

This road will erect a freight house and office building at Temple, Tex. The building will be 32 ft. wide and 266 ft. long with concrete foundations, brick walls and tile roof. The office portion will be two stories high and the freight house one story high. Bids will be opened in about 30 or 45 days and construction is expected to start within two months. The estimated cost is $40,000. F. Merritt, Galveston, Tex., is chief engineer.

THE GULF, MOBILE & NORTHERN has authorized the expenditure of $1,000,000 for terminal development at Mobile, Ala. The initial unit of the improvement will consist of piers, warehouses and dock facilities, including 4,000 lin. ft. of piers, 2,000 lin. ft. of warehouses, portions of which will be two stories in height and containing approximately 200,000 sq. ft. of floor space, lumber docks with 2,000 ft. frontage on Mobile bay, dredging and the installation of cranes and carriers for the handling and storing of cargoes. This work is to cost $500,000 and will be begun on the completion of the final plans.

THE GULF, PLAINVILLE & NORTHERN plans to build a line from Great Bend, Kan., north to Hoisington, Hays City, Plainville and Norton, a distance of approximately 150 miles. It also plans to build a branch line from Plainville northeast to Laton, Covert and Osborne, a distance of about 50 miles. A contract has been let to the Imperial Promotion & Construction Company, Osborne, Kan., which will buy all equipment and let further contracts.

THE ILLINOIS CENTRAL has awarded a contract to the L. J. Smith Contracting Company, Kansas City, Mo., to construct a line from Dawson Springs, Ky., to Providence, a distance of about 17½ miles. About 600,000 cu. yd. of grading will be necessary, a large portion of which is rock.

This company has also awarded a contract to the Walsh Construction Company, Davenport, Iowa, for grade reduction and line revision on the road between Scottsburg, Ky., and Dawson Springs, a distance of 11½ miles. This work involves 700,000 yd. of grading, a large portion of which is rock, and also the construction of a 75-ft. span and approach trestle over the Tradewater river.

The road is completing plans for the building of a freight house and office building at Champaign, Ill., which will cost approximately $40,000. The building will be of brick construction with a concrete foundation and slate roof. It will be 340 ft. long, of which 250 ft. will be one-story high, and the remaining 90 ft. two stories. In addition to this there will be 130 ft. of covered platform. The road is also drawing preliminary plans for a power house at the same point, which will be 49 ft. wide and 60 ft. long, of brick construction and cost about $15,000.

This company is also contemplating the building of a freight house and office building at Kankakee, Ill., similar to the proposed Champaign structure.

THE KLAMATH FALLS MUNICIPAL RAILWAY, which will be the first unit of the Oregon, California & Eastern, is building a line from Klamath Falls, Ore., to Dairy, a distance of 20 miles.

A contract has been let to the Robert E. Strahorn Construction Company, Spokane, Wash. The work involves about 250,000 cu. yd. of grading, of which approximately 75,000 cu. yd. is rock. The maximum gradient is 1.25 deg. and the maximum curvature 6 deg. R. E. Strahorn, Spokane, is president and N. H. Bogue, Klamath Falls, is chief engineer.

THE MIAMI MINERAL BELT has awarded a contract to the Hedges & Allhands Construction Company, Springfield, Mo., to construct a line from Quapaw, Okla., through Century, Cordon and Picher, to Baxter Springs, Kan., a distance of 20 miles. The maximum grade of the road is 1 per cent and the maximum curvature 6 deg. The work involves approximately 7,000 cu. yd. of grading per mile and is about half completed.

THE MINERAL BELT is the name of a company now building about five miles of new line between Sulphur Mine, Va., which is on the Chesapeake & Ohio and Valzinco Mine. The work includes one steel and concrete bridge of 390 ft. and about 100 ft. trestle approach on each side. G. P. Clay, Richmond, Va., is the contractor. It is expected that the work will be finished before September this year.

THE MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE has been awarded a contract to the Thompson-Starrett Company, Chicago, for the construction of a 1,150,000-bu. grain elevator as an addition to its present plant at North Minneapolis, Minn.

This company has also awarded a contract to the Withee Construction Company for the construction of a depot at Stevens Point, Wis. The building will be two stories high, of brick and reinforced concrete construction.

THE NEW YORK CENTRAL is contemplating the elevation of its tracks at South Bend, Ind.

This company has ordered that the work on the bridge and connecting railroad crossing the Hudson river at Castleton, N. Y., nine miles south of Albany, be continued. On the passage of a law, by the New York legislature, last month, forbidding the construction of a two-span bridge at this point, some of the preliminary operations were suspended.

THE NORTHERN PACIFIC is enlarging its division yards at Livingston, Mont., by adding five miles of additional tracks. The increase of the yard necessitates the abandonment of the present storeroom facilities and the construction of a new two-story storehouse, 50 ft. by 200 ft., a storehouse platform, 70 ft. by 500 ft., and a reinforced concrete oilhouse, 30 ft. by 50 ft. The track work, together with store facilities and other changes, will cost about $110,000. The work is being done by company forces and is planned to be completed by September 1.

This line has awarded a contract to the Clifton, Applegate & Toole Construction Company, Spokane, Wash., to construct an extension to the Cowiche branch, the present line extending from North Yakima, Wash., to Weikel. The extension will be seven miles long, beginning at Weikel, and will cost about $200,000.

The engineering department of this company, in conjunction with C. Claussen, city engineer of St. Paul, Minn., is drawing preliminary plans for an ore dock on the Mississippi river below Indian Mounds (St. Paul), Minn. The dock will be 600 ft. long, with 1,100 ft. of approach trestle, and will have a capacity of 6,000 tons. The superstructure will be of wood pile trestle, and the distance from the water surface to the track level will be about 30 ft.

This company will construct a steel and concrete bridge over the Shields river near Livingston, Mont., to replace the old wooden bridge recently destroyed. The new structure will cost approximately $200,000.

THE PENNSYLVANIA LINES WEST plan to build an addition to the shops at Columbus, Ohio, which include a tank shop, 40 ft. high, 95 ft. wide and 300 ft. long; a machine shop, 60 ft. high, 100 ft. wide and 220 ft. long; a boiler shop, 40 ft. high, 143 ft. wide and 170 ft. long, and a flue shop, 20 ft. high, 83 ft. wide and 108 ft. long. The buildings will be of brick and steel construction, and the cost, including equipment, will be approximately $1,000,000. Work will not be started until fall.

This company has awarded a contract to the Alliance Construction Company, Indianapolis, Ind., for the construction of an engine house and annex at Indianapolis. The annex will be 60 ft. wide by 150 long and one-story high; the engine house will be 110 ft. deep and have 10 stalls. Both buildings will be of brick construction with reinforced concrete foundation.

THE PENNSYLVANIA RAILROAD is now building a tank and cab shop at its Juniata shops, Altoona, Pa., which will be a one-story building, 82 ft. by 300 ft., of structural steel and brick construction. The work is being done by railroad forces. The structural steel work has been ordered from L. F. Shoemaker, Pottstown, Pa.

This company has awarded a contract to A. L. Anderson & Bros., Altoona, Pa., to build about 9 miles of line along Ten Mile Creek, from Champion, Pa. (formerly Besco), southwest towards Waynesburg, to a point just below Jefferson.

THE PHILADELPHIA & READING has completed plans for a through plate girder highway bridge, with concrete floor, with a clear width of roadway of 24 ft. and two sidewalks 7 ft. each, to be built over the P. & R. tracks on Greenwood avenue, Hopewell, N. J. The bridge will span four tracks. The work will be done under a contract which John A. Kelley & Co. was awarded over a year ago.

This company has also given a contract to Seeds & Dernham, Germantown, Philadelphia, Pa., to build a new bridge over the Schuylkill river at Belmont, Philadelphia, on the main line. This will be a four-track concrete arch bridge, with eight arches of about 103 ft. span each.

This company has also let contracts for the grading and masonry in connection with the construction of third and fourth tracks between Belle Meade, N. J., and Manville, to Richards and Gaston, inclusive, New York. Contracts for bridge superstructures have been let to the Phœnix Bridge Company for bridges east of Belle Meade, west of Hamilton and east of Weston, and to the American Bridge Company for a bridge west of Weston. A contract has also been let for grading north and south of Saucon creek, South Bethlehem, Pa., to C. P. Bower, Philadelphia, Pa.

THE ST. JOSEPH & GRAND ISLAND has started the reconstruction of the sub-structures of its bridge crossing the Missouri river at St. Joseph, Mo., which work involves the replacing of the present draw span 357 ft. 8 in. long with one 465 ft. long and the moving of the 3 remaining spans (each approximately 300 ft. long), longitudinally 136 ft., onto new piers.

THE SOUTHERN PACIFIC is rehabilitating a portion of one of its old car shop buildings at Sacramento, Cal., which was lately injured by fire. The work will cost approximately $30,000.

THE UNION PACIFIC has awarded a contract to the Eberhardt Construction Company to construct a freight depot at Salina, Kan., which will be of reinforced concrete. The total cost of improvements, including track work, will be about $100,000.

THE VIRGINIAN has let contracts to the Rinehart & Dennis Company, Charlottesville, Va., for the grading and to the Virginia Bridge & Iron Company, Roanoke, Va., for steel bridges in connection with double tracking work now under construction, from Bud, W. Va., easterly 5 miles. There will be three steel bridges with a total length of 1,125 ft. The track laying will be carried out by company forces.

THE WESTERN PACIFIC has awarded a contract to the Utah Construction Company, Ogden, Utah, to construct a line from Reno, Nev., to Chilkoot, Cal., a distance of 35 miles. The work will involve the building of about 18 miles of new line, and the widening of the present narrow gage line for the balance of the distance.

This road is locating a line from Niles, Cal., down the Santa Clara valley to San Jose, a distance of about 13½ miles. Work will be started as soon as plans are completed and it is expected to commence operation before June 1, 1918.

STRUCTURAL STEEL

THE GREAT NORTHERN has ordered 270 tons of bridge steel from the Wisconsin Bridge Company.

THE GREAT NORTHERN has awarded a contract for 270 tons of steel to the Wisconsin Bridge Company.

THE MISSOURI PACIFIC has ordered 100 tons of steel from the American Bridge Company for girder spans.

THE PENNSYLVANIA RAILROAD ordered 140 tons of bridge steel from the Phœnix Bridge Company and 535 tons from other bridge shops.

SUPPLY TRADE NEWS

GENERAL

THE RAILROAD, WATER & COAL HANDLING COMPANY has been awarded a contract by the Chicago, Rock Island & Pacific for the construction of a wooden coaling station of 500-tons capacity at Trenton, Mo.

THE BARRETT COMPANY, New York, announces the appointment of T. A. Warton as representative of the railway sales department for the Cincinnati, Ohio, branch, with headquarters at 527 Carr street, Cincinnati.

THE C. F. MASSEY COMPANY, Chicago, placed additional factories in operation at Youngstown, Ohio, and at Los Angeles, Cal., on July 1, making 13 plants now in service. C. Hunsacker has been transferred to Youngstown and placed in charge of the plant at that place, while N. R. Brown, formerly with the Lehigh Portland Cement Company, has assumed charge of the plant at Los Angeles.

IN THE CIRCUIT COURT OF MISSOURI, April 25, the Concrete Mixing & Placing Company, Chicago, was awarded judgment in its suit against the McMahon Construction Company of St. Louis. The McMahon Construction Company had bought and used a machine which the plaintiff claimed was an infringement on the one controlled by it. The judgment was for damages for failure to use the machine of the Concrete Mixing & Placing Company.

THE MARK MANUFACTURING COMPANY, Chicago, will spend approximately $14,500,000 in the construction of a steel plant at South Chicago. This is $9,500,000 in excess of the cost as estimated a year ago. The new plans provide for the construction of a 600-ton blast furnace, with docks, ore and coke-handling machinery, which was not in the original plans, and also an open hearth steel department with a capacity of 250 gross tons of ingots per year.

THE WALTER A. ZELNICKER SUPPLY COMPANY, St. Louis, Mo., and affiliated companies are now represented in the Birmingham district by Thomas A. Hamilton, who for the past 14 years has been connected with Crane Company, prior to which he was superintendent of the East St. Louis plant of the Zelnicker Car Works. Mr. Hamilton will have charge of both buying and selling in the southeastern district. His office will be at 1018 Woodward building, Birmingham, Ala.

THE WALLS FROGLESS SWITCH & MANUFACTURING COMPANY, Kansas City, Mo., has leased a building at Twenty-third and Broadway, Kansas City, where it will manufacture the Walls Frogless Switch. The device does away with the old style point frogs and slip switches and provides for a straight rail at all times. It is expected that the factory will be in operation by September 1. W. J. Stoneburner has been appointed general manager of the company, with headquarters at Kansas City, Mo. C. E. Ennis has been appointed assistant secretary.

PERSONAL

W. W. HALL, formerly Pittsburgh sales manager of the Republic Iron & Steel Company, has been appointed assistant general manager of the Columbia Steel & Shafting Company, Pittsburgh, Pa.

KARL W. BOCK, formerly secretary and assistant to the vice-president of the Union Pacific Coal Company, Omaha, Neb., has been appointed manager of the Walter A. Zelnicker Supply Company, St. Louis, Mo.

FRANK B. BRADLEY, vice-president of the Ajax Forge Company, Chicago, died at his home in that city on July 14. Mr. Bradley was born at Lake Forest, Ill., on May 6, 1866, and entered the service of the Ajax Forge Company in 1884 as an office boy. With the exception of a few years with the Morden Frog & Crossing Works, the Buda Foundry Company and Clement, Curtis & Co., he has been continuously with the Ajax Forge Company, having special charge of the sales department. In addition to his regular duties, he invented and perfected several railroad track specialties.

I. P. SPINING, who has been appointed assistant to the general traffic manager and railway sales manager of the Certain-teed Products Corporation, with headquarters at St. Louis, Mo., was born at Cincinnati, Ohio. He entered railway service with the Chesapeake & Ohio, at Cincinnati, and later served consecutively as joint ticket agent of the Cleveland, Cincinnati, Chicago & St. Louis and the St. Louis, Iron Mountain & Southern at Cairo, Ill.; city passenger agent and assistant to the assistant passenger agent of the Cleveland, Cincinnati, Chicago & St. Louis, at St. Louis; northwestern representative of the Chesapeake & Ohio at Chicago; general agent of the Big Four at Chicago, and later also general agent of the Michigan Central. After leaving the Michigan Central he became associated with Toch Brothers, New York, handling railroad accounts in eastern territory. Upon the reorganization of the Buffalo & Susquehanna he became general freight and passenger agent of that road, with headquarters at Buffalo, N. Y. On December 1, 1916, he was placed in charge of railroad sales for the Certain-teed Products Corporation in the Chicago district, which position he held until his recent appointment.

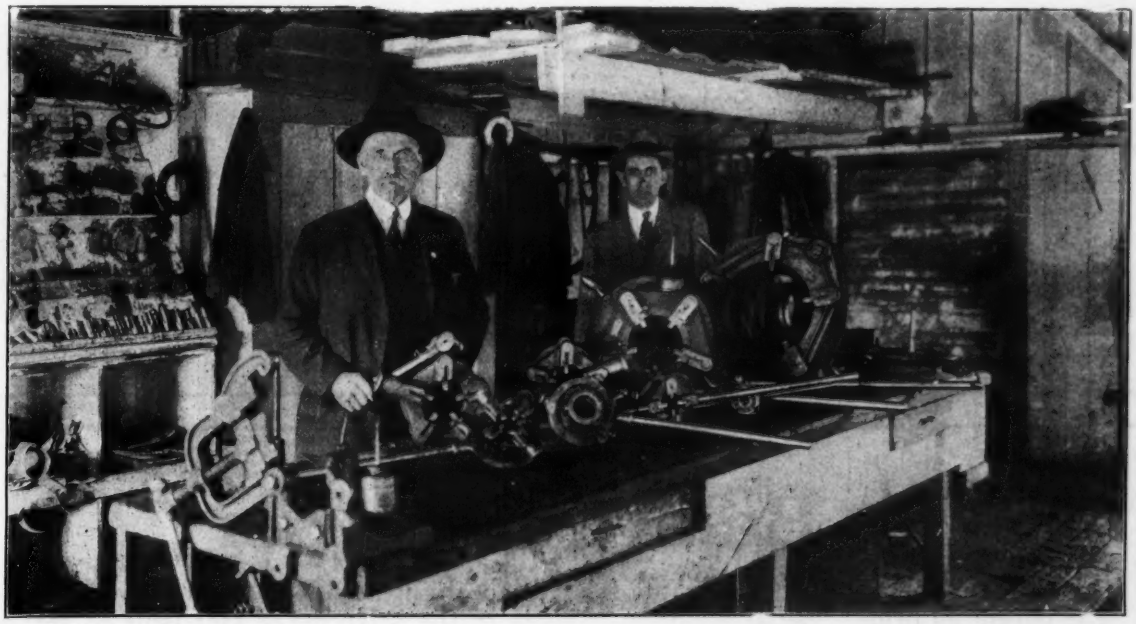
HERBERT DEEMING, who has been appointed sales manager of Mudge & Co., with headquarters in the Railway Exchange, Chicago, was born in England on April 16, 1880. He began his business career as a stenographer and clerk in the general passenger department of the Fremont, Elkhorn & Missouri Valley at Omaha, Neb., in October, 1897. From July, 1899, to September he was with the American Express Company at Omaha, and from the latter month until January, 1900, he was employed in the general superintendent's office of the Fremont, Elkhorn & Missouri Valley. He was then promoted to secretary to the general freight agent of the same road, and in July, 1902, went to Chicago, where he was employed in the auditor's office of the Chicago & Western Indiana. In January, 1903, he was promoted to a position in the president and general manager's office. From July, 1903, to February, 1916, he was secretary of the General Managers' Association, at Chicago, and from November, 1907, to February, 1916, was also secretary of the Association of Western Railways. In March, 1916, he became assistant director of the Railway Educational Bureau at Omaha, Neb., and seven months later he became associated with the H. E. Reisman Advertising Company, which position he held until his recent appointment.

H. DEEMING

TRADE PUBLICATIONS

STEEL HARDENING.—The Stroh Steel-Hardening Process Company, Pittsburgh, Pa., has issued a well-illustrated book of 24 pages, describing its process for the casting of fine alloy steel together with ordinary soft steel in one solid piece to give a casting with high resistance to wear. In addition to containing information concerning the process, illustrations and data are presented regarding the various uses of this process in the manufacture of gearings, frogs and crossings, etc.

A NEW IDEA IN TWIST DRILL CATALOGUES.—The Cleveland Twist Drill Company, Cleveland, Ohio, has incorporated in its newest twist drill catalogue, No. 39, a thumb index and various other features which will distinguish it from the usual twist drill catalogue. The thumb index will enable the drill user to locate any one of the ten sub-divisions, and each index is supplemented further by a detailed index of the particular section. Each of the sections is also prefaced by an illustration graphically portraying some item in the manufacture of Cleveland tools or some unusual sales point in one of these tools. All the regular tools are shown and some of the special tools.



What a Practical Old-Time Railroad Man Thinks of "Toledo" Tools

The Colorado & Southern Railway Co.

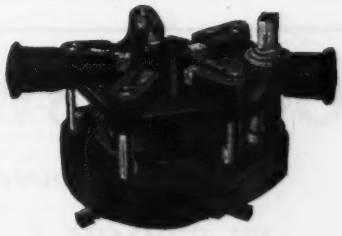
Denver, Colo., 6-12-17.

Toledo Pipe Threading Machine Co.
Toledo, Ohio.

Gentlemen:—It gives me pleasure to do my little "*bit*" for the "Toledo" pipe machine. I have handled all kinds of pipe dies for the last forty years, and you know the kind of back-breaking, muscle-racking job it was to cut and thread 2½ in., 3 in., and 4 in. pipe; 5 in. and 6 in. pipe was really out of the question. No trick at all with a "Toledo." My company has all sizes of the "Toledos" from ¼ in. to the "Big Boy," 12 in. While it takes two men to handle the big machine, one man can do the work after the machine is on the pipe; and the beauty of it is, you can cut a clean thread true to gauge any old place; sticking through the floor, through the wall or drop through the ceiling; just so you have room to put the machine on. When you have to make a cut in the ground you don't have to dig up a length of pipe, just find a coupling if handy, if not make two cuts and dig a hole wide enough to handle the machine. I can cut a thread on 12 in. pipe with less than 18 in. swing on the ratchet handle. I have a great deal of 6 in. and 8 in. underground work. Two men are all that are necessary to cut in a tee or a wye. Long live the "Toledo" pipe dies.

Yours truly, C. W. FELLOWS,
CWF-GS Fore. W. S., B. & B. Dept. C. & S. Ry.

Mr. Fellows, who is in the foreground of the picture, has had years of experience in mountain railroad work, and his statements are authoritative.



This "Toledo" No. 2, threading 2½ in. to 4 in. pipe, is one of the twelve different models having a range from ⅛ in. to 12 in. pipe.

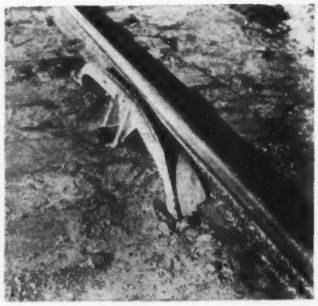
Whether it is the little one, threading ⅛ in. to ¾ in. pipe, or the big fellow, threading 9 in. to 12 in., each one is efficient and able to do the hard job easily, year in and year out.

Hundreds of mine engineers realize the importance of having an equipment of "Toledos," ready for immediate use any moment.

Ask us for your copy of the "Toledo Pipe Threading Hand Book."

The Toledo Pipe Threading Machine Co., Toledo, O.

New York Office, 50 Church St., 369 Hudson Terminal



Note the foot guard and the wearing insert. Weight 80 lbs.

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The results are just as attractive as the appearance

Save $8.00 per Turnout. Write for catalog

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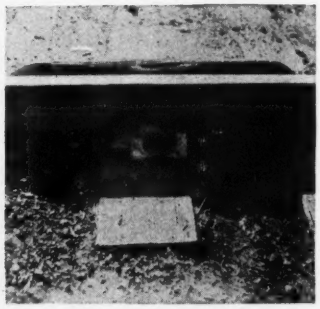

Note the key locked with a spike and the length of guard rail

A Balanced Paper

Have you ever studied the Railway Maintenance Engineer to see how thoroughly it covers its field? Special attention is given to the balancing of each issue to see that every branch of the Maintenance of Way Department is given its proper attention and space. The editors have continually before them the necessity of presenting in each issue information which will be of direct value to readers interested in the different phases of this work. This is what is making the Railway Maintenance Engineer such an important factor in the affairs of this department.

FROGS — SWITCHES — STANDS

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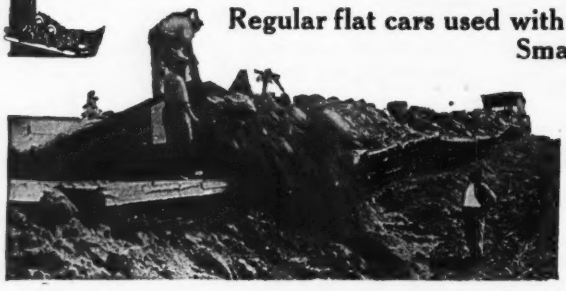

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Type C

Note the clamp

Note the clamp

Reading Rerailers

YOU know what it means when your rerailers slip or turn over under the weight of car and engine. You know the delay that ensues, the smashed ties and the petty annoyances, especially when time is the important factor.

Don't spike replacers. Spiking destroys your ties. Insist on Reading Rerailers; replacers for all weights of cars and engines and all heights of rail.

Fastened To the Rail With Reading Clamps

Remember there is a rerailing point on every replacer; that point (note illustration above) is just before the wheels reach the end of either replacer. The Reading Rerailer can't slip or turn over, for the replacers rest on the base of the rail. *Ties are not depended upon to hold replacers up—if replacers settle, the rail settles with them.* Reading Replacer Clamps fit any replacer.

Safety First—Certainly! For you don't have to get under the derailment to place them.

You never tested the Reading Rerailers with the Reading Replacer Clamps? A trial will convince you. Our guarantee is back of this assertion.

We sell direct to you from our plant—always ready—always in stock—prompt delivery always.

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Type A and A-1

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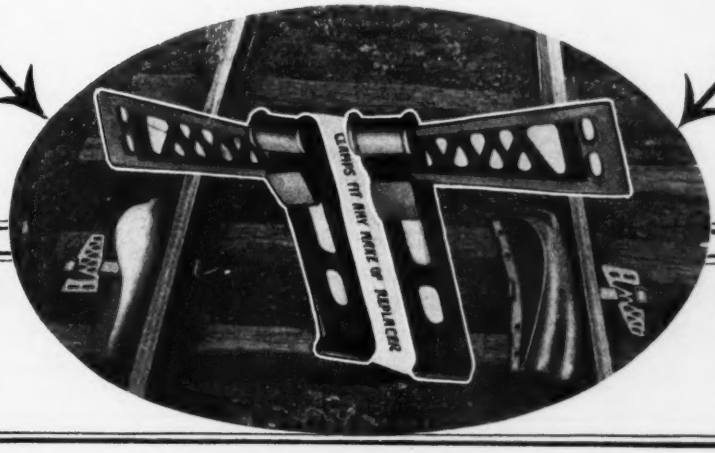

BRANCH OFFICES
1st National Bank Bldg., Denver, Colo.
932 Oliver Bldg., Pittsburgh, Pa.
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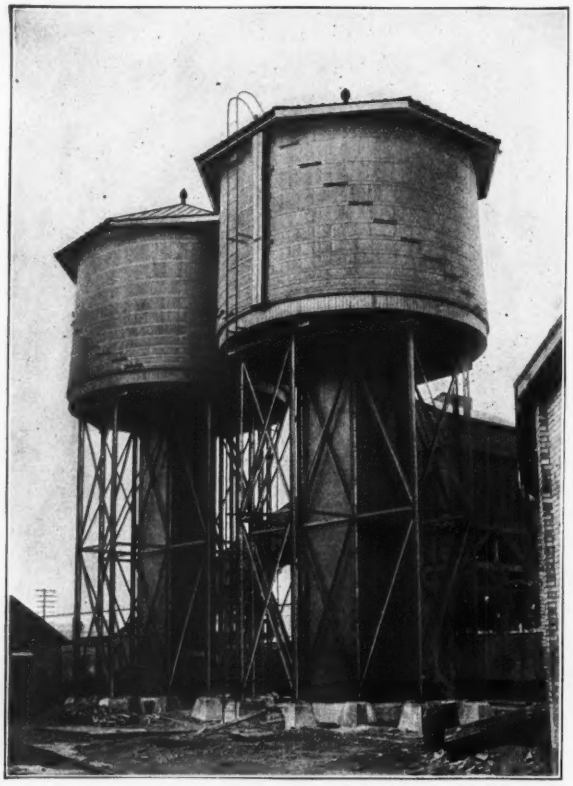
Clamps fit any make of replacer

Clamps fit any make of replacer



Two 50,000 gallon tanks erected on 30-foot 12 post steel towers.

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for elevating tanks can be furnished in any height desired, with four or twelve posts, that will meet the approval of the most exacting engineers, and they can be easily erected under your own supervision.

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Railroad Dept. **BATAVIA, ILL.**

The Lonesome Game

THE selling game is a lonesome job at best. Every day the same old grind, the same old drill against indifference and hard luck; and every night, some new town, some new hotel and a newer bed.

And how much more lonesome still when few railway men have ever heard about you or your goods; and how much harder to put the steam behind your talk and the punch into your arguments when you feel that very little thought or effort has been made to push you to the front.

Surely, it's a mighty lonesome job, an uphill fight, a scrap of brains and brawn against sheer indifference. Oh, yes, salesmen fight and dig and plug against these heavy odds and they do win with profit to their firms and to themselves. But, oh, for the magic touch of advertising; for the ever open-sesame of publicity that heralds you and sings your wares, that moves you faster along your route and gets you by the outer office guards! For **you** know that advertising would blaze your trail, would smooth your way, and would make the salesman's game, the King of Games, SUCCESS.

The Cement-Gun in Railroad Service

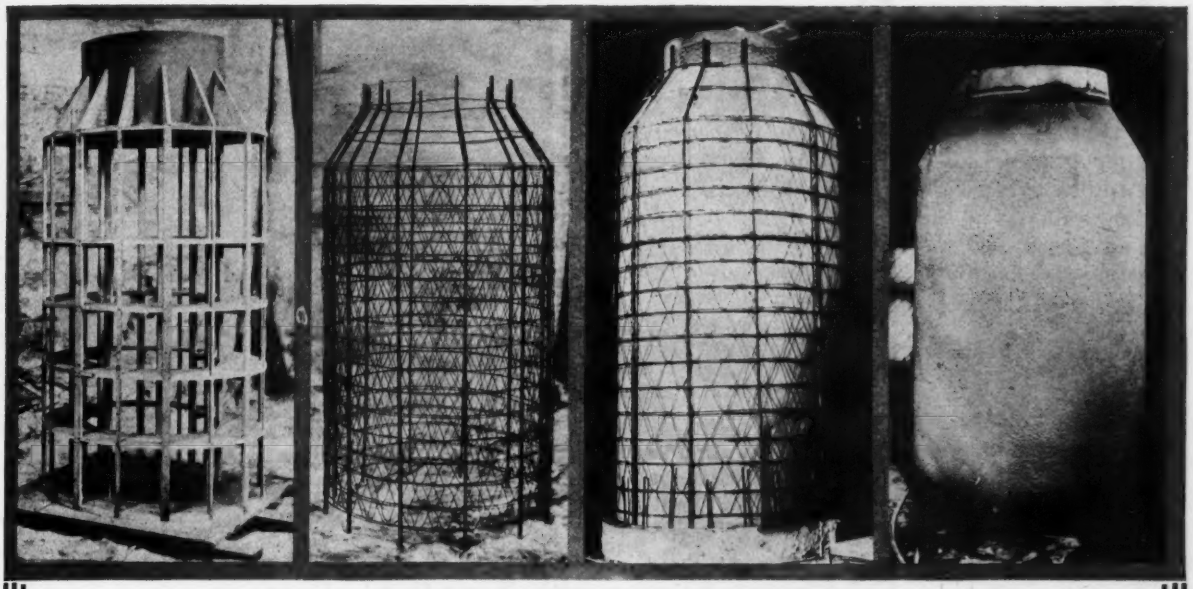


Fig. 1 Fig. 2 Fig. 3 Fig. 4

Something New in Battery Vaults

EACH month shows new uses and extended service for the Cement-Gun on our "Nation's Arteries." North, East, South and West, the railroads are employing it to insure those four predominating factors of modern railroad operation—efficiency, durability, economy and service. Every day, "somewhere on American railways," a new use is found for, new economies secured by, *the gun of general utility* in railroad work. Here is something new in Battery Vault design and construction. New—yet but another example of

The Utility of the Cement-Gun; the Durability of "Gunite"

This Battery Vault, which extensive and severe tests have proved possesses to a marked degree the qualities of *strength,* service, *waterproofness and economy.*

The method of construction? Simple, yet just the reverse of the usual custom. Wooden shelving of the desired size built first (Fig. 1). Next the steel reinforcements (Figs. 2 and 3). Then—finished vault coated by the Cement-Gun with

"Gunite" the Element-Defying Material

That sand-cement product of the Cement-Gun, of which recent tests made by the Testing Laboratories of the University of California but prove what extended actual service has indicated—*that even under very high pressure "Gunite" is absolutely watertight.*

That factor, combined with those stated above, are the reasons—mighty strong ones, too, why such roads as the Pennsylvania, New York Central, D. & H., C. B. & Q., P. L. E. & W., Seaboard Air Line, and many others, are armed for every cement need with the Cement-Gun.

A Cement-Gun for Every Division

Insures saving in Time and Money the Whole Road Through. Send for the Cement-Gun Booklet and make us prove that. The Cement-Gun is not a restricted article. It can be purchased outright and used by anyone.

CEMENT-GUN CO., Inc., Allentown Pa.

New York Office, 30 Church Street

E. R. Ayers, 1414 Fisher Bldg., Chicago, Ill., John A. Traylor, Newhouse Bldg., Salt Lake City, Utah, Taylor Engineering Co., 538 Central Bldg., Seattle, Wash., Taylor Engineering Co., Vancouver, B. C.

Massey Concrete Cattle Pass

Here's a point of superiority you engineers will recognize—only in the Massey cattle pass is the reinforcing placed in the region of tension throughout. The cross-section illustrates this big advantage. The strength it adds should be considered when you are contemplating the installation of cattle passes.

The Massey cattle pass is made up at our factories in units 6' long, 84" wide by 72" high inside. Two head of cattle pass through side by side. A flat bottom gives them broader footing.

The Massey pass is built to carry the dead load in deep fills, and live loads when placed within about 3' of the base of the rail. It is more economical than any other type of structure, and requires absolutely no maintenance.

Massey factories make concrete culvert pipe, 12" to 84" in diameter, concrete bridge slabs, piles, and portable concrete houses. Our plant locations and large stock of standard products enable us to make prompt deliveries at low freight rates.

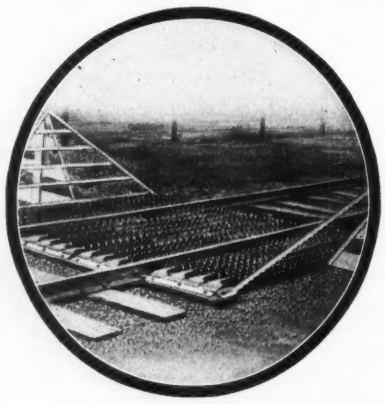
Get Massey Service with Your Cattle Pass

C. F. MASSEY COMPANY

NEW YORK
NORFOLK
KANSAS CITY
Peoples Gas Building
CHICAGO
MINNEAPOLIS
SPOKANE
DALLAS

Factories Located at

Newark, N. J.
Chicago, Ill.
Memphis, Tenn.
Anna, Ill.
Youngstown, Ohio
Los Angeles, Cal.
Kansas City, Mo.
Meridian, Miss.
Minneapolis, Minn.
Spokane, Wash
Dallas, Tex.
Chatham, Ont., Can.



Steel Guards—

Are effective, durable, noiseless and maintained at extremely low cost. The new 1917 National Steel Cattle Guard is the most economically maintained cattle guard in use. Easily installed without previous experience or preparation. No parts to get out of order. Impervious to corrosion and all weather conditions. The vertical steel construction will not allow rain or salt water drippings to lodge on the guard.

New Illustrated Circular and Blueprints FREE

Write for our new illustrated circular on the 1917 "NATIONAL," telling why the "NATIONAL" is being used by leading railroads. Blueprints furnished on request. Write today.

National Surface Guard Company

Fisher Bldg. Chicago, Illinois

It Stays in the Wood!

WE recommend the exclusive use of **Reilly's Improved** (Permanent) **Creosote Oil** for the empty cell process of treating wood. Our recommendation is based upon twenty years experience in manufacturing all grades of pure creosote oil products.

One gallon of this oil is more efficient, in permanent work, than ten gallons of the next best grade. For it contains more than ten times the percentage of permanent products, besides containing basic fixed oils, which no other creosote contains.

We will gladly send a sample for distillation test in your own laboratory. You will find that at least 75% will fail to distill at 315 degrees C. Then test the oil you are now using, and probably less than 25% will be left at the same temperature.

The volatilition of the "next best" will demonstrate one of the several scientific reasons why **Reilly's Creosote** is the one oil specifically suited for empty cell treatment.

Reilly's Wood Preservative Oil

is our best product for open tank or brush treatment. A high-boiling anthracene oil—limpid and free flowing at working temperatures. Contains no adulterant or volatile products.

Send for Sample

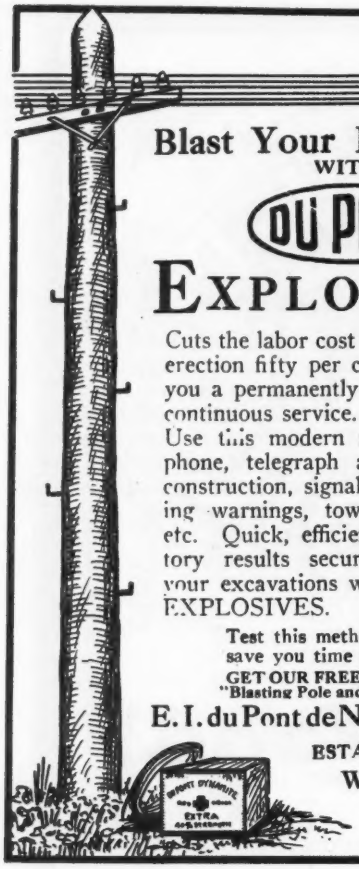
Reilly's Improved (Permanent) **Creosote Oil** coats every fibre of the wood permanently. Permanency *vs.* "evaporativeness" expresses relation of **Reilly's Creosote Oil** to other Creosote Oils.

The necessity for a proper oil to protect timber so that its full services could be obtained, explains the invention of **Reilly's Creosote Oil** It never comes out. And it is the only oil we know of that will permanently preserve piling and ties *in every climate.*

We have the goods and can make shipments. Write for full particulars and prices. We can also furnish treated timber of all dimensions at attractive prices

Republic Creosoting Company

Plants: Indianapolis—Minneapolis—Seattle—Mobile **Indianapolis, Indiana**



Blast Your Pole Holes
WITH
DU PONT
EXPLOSIVES

Cuts the labor cost of pole and post erection fifty per cent, and insures you a permanently secure line and continuous service.

Use this modern method in telephone, telegraph and power line construction, signal systems, crossing warnings, tower foundations, etc. Quick, efficient and satisfactory results secured by blasting your excavations with DU PONT EXPLOSIVES.

Test this method. It will save you time and money.
GET OUR FREE BOOKLET:
"Blasting Pole and Post Holes."

E. I. du Pont de Nemours & Co.
ESTABLISHED 1802
Wilmington,
Delaware

EMPLOYMENT BUREAU

MR. ROADMASTER, are you in need of a good, trustworthy foreman for track work? Address A. A. Jewell, Hinsdale, Catt, Co., N. Y.

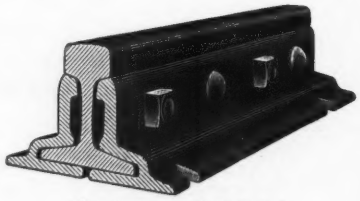
Use this section when seeking a new man, a new position, or when buying or selling second-hand equipment.

Rate is 2c a word a month. Minimum charge $1.00. Remittance must accompany each order. Address Railway Maintenance Engineer, Classified Advertising Department, Transportation Building, Chicago, Illinois.

The Rail Joint Co.

GENERAL OFFICES:

61 Broadway New York City



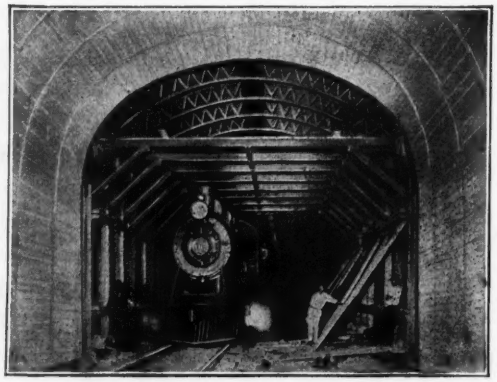
Continuous Rail Joint

Makers of Continuous, Weber, Wolhaupter and 100% rail joints.

Standard—Insulated—Step—Frog and Switch Types.

Grand Prize San Francisco 1915

Protected by Patents



RAPID WORK—LOWER COST
BETTER RESULTS
AND NO DELAY IN TRAFFIC

These are some of the advantages secured by railroads that line tunnels by the

Pneumatic Method of Mixing and Conveying Concrete
(Patented)

Labor cost and time are reduced to one-third. Less equipment is required—No other mixer, no cars, no tracks, no elevated platforms, no locomotives.

Tests of small blocks taken at random from the Wilson Avenue Tunnel, Chicago, for testing, proved not alone their exceeding density, but in many cases proved so hard that the equipment of the Underwriters' Laboratory could not crush them.

Used by C. B. & Q. and other leading roads. They secure better work at half the cost of other methods.

We lease equipment, or do work on contract.
Send for descriptive literature.

CONCRETE MIXING & PLACING CO.
123 W. Madison St. - - CHICAGO

Truscon Steel Small Freight and Passenger Station

Made by the Mile—Sold by the Foot

Truscon Steel Buildings are the ideal structures for railroads—the only buildings for emergencies, on construction work, or where original facilities are to be enlarged or re-located.

Truscon Steel Buildings are made of inter-changeable pressed steel sections. They assemble like your sectional bookcase—and as easily.

Fire-proof, storm-proof, vermin-proof, quickly erected and practically everlasting, Truscon Steel Buildings give the acme of service you can ask of a one-story structure and present advantages peculiar to their design.

When work is done in one place, take down the house, carry it any distance and re-erect it as good as new.

Besides the station building shown in the illustration, section houses, oil, coal, storage and bunk houses, construction offices, yard houses, crossing watchmen's boxes, etc., are a few of the hundreds of uses which railroads find for Truscon Steel Buildings.

When a wooden station burns, you can ship a Truscon to replace it by the first train.

Truscon Steel Buildings are in a class by themselves and not to be confused with other light metal and portable structures.

Send for the "Truscon" Book

Truscon STEEL BUILDINGS

PORTABLE PERMANENT

KAHN Building Products

Trussed Concrete Steel Company

Representatives in Principal Cities. : : : Railroad Department, Youngstown, Ohio

KAHN Building Products

Capacity 50,000 Gals. Height 20 Ft. to Bottom
Chicago & Northwestern Ry.

STEEL TANKS
For
RAILWAY SERVICE

Build For The Future

The Corporations which show the most enviable dividend record over a period of years are those which have followed this policy.

A Steel Tank Is An Asset That Does Credit To Your Judgment

Chicago Bridge & Iron Works

SALES OFFICES
Chicago, Ill. Charlotte, N. C.
New York, N. Y Salt Lake City, Utah
Dallas, Tex. Seattle, Wash.
Jacksonville, Fla. Los Angeles, Cal.
Detroit, Mich. SanFrancisco, Cal.
Havana, Cuba Bridgeburg, Ont.

SHOPS
Eastern: Greenvile, Pa. Pittsburgh Dist.
Central: Chicago, Ill.
Canadian: Bridgeburg, Ont.

CABLE ADDRESS
"Chibridge Chicago"

When service is a factor it pays to demand a material of known value and enduring quality.

Apollo-Keystone

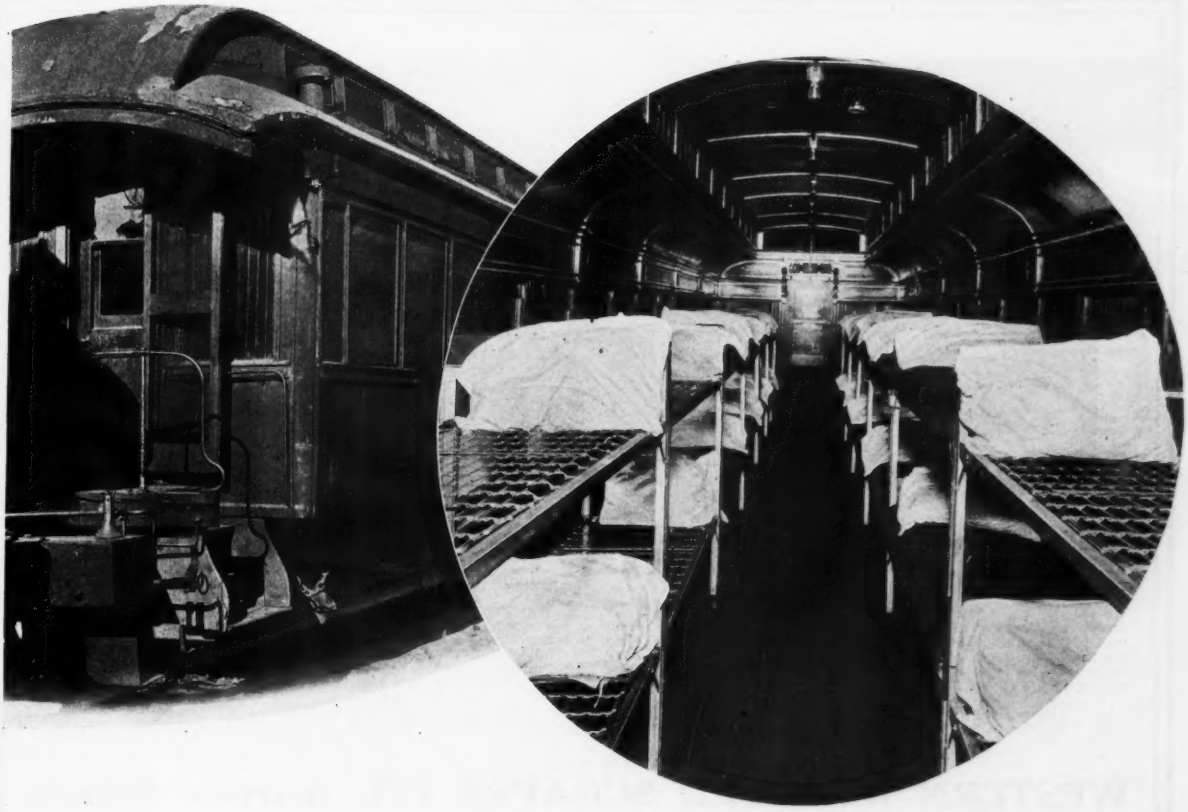
COPPER STEEL
Galvanized Sheets

represent the highest standard of manufacture and assure the user the utmost of satisfactory service and resistance to rust. When you are paying the price of good galvanized sheets—you should be getting APOLLO-KEYSTONE. Actual time and service tests have proved the superiority of copper steel sheets. *Demand Apollo-Keystone for Culverts, Flumes, Tanks, Roofing, etc.*

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

DISTRICT SALES OFFICES:
Chicago Cincinnati Denver Detroit New Orleans New York Philadelphia Pittsburgh St. Louis
Export Representatives: UNITED STATES STEEL PRODUCTS COMPANY, New York City
Pacific Coast Representatives: UNITED STATES STEEL PRODUCTS COMPANY, San Francisco, Los Angeles, Portland, Seattle



"Dog Days" Are Here—Cool, Clean Sleeping Quarters Are Essential

August—a month of sweltering days and oppressive nights—is not a particularly happy month for the man who must be "on the job" day after day. But when restless, uncomfortable nights follow days of hard work, men soon become discontented, efficiency drops, and costs rise. Many railroad officials realize this and in using

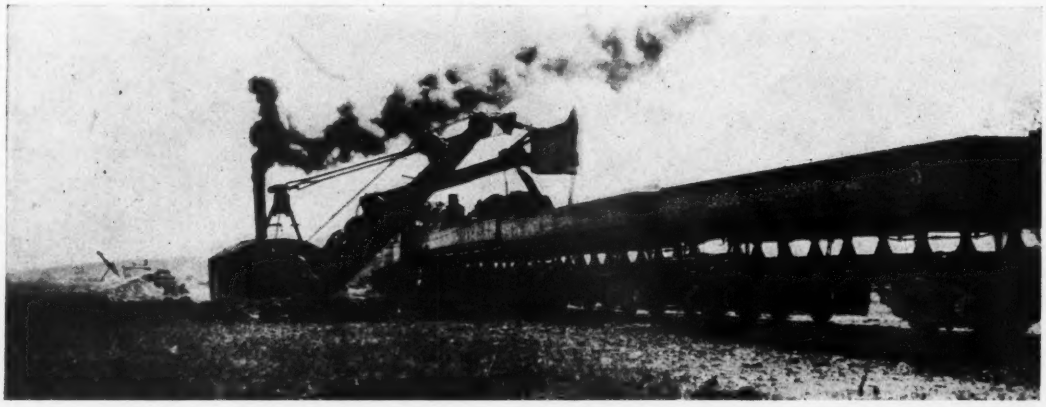
Romelink All-Metal Bunks for Work Trains

are doing a lot to relieve the situation. Men are quick to appreciate the cool, airy quarters, made possible by using these bunks—they notice the comfortable difference over the warm, ill-smelling, old-fashioned wooden bunks. The men feel better, work better and remain contented—and that's a big point to consider with labor so scarce.

Romelink Bunks, in addition to being cool and clean, are practically unbreakable—they last a lifetime—the galvanized solid steel, hand-riveted frame, and the patent sagless spring guarantee that. No cracks or crevices to collect dirt or harbor vermin—no trouble to keep clean. Romelink Bunks can be knocked down for shipment to another section in a few minutes, and they take up a minimum of space in transit. Question us in detail and get prices.

Southern-Rome Company

617-633 West Pratt St. BALTIMORE, MD.



Western Air Dump Cars

are in use on all the Great Earth Moving Enterprises on the American Continent. Their records are well known on such jobs as the Panama Canal, the Lackawanna Cut-off, the Keokuk Dam, and scores of others of but little less importance. In all instances their performance has been the subject of much favorable comment.

Western Dump Cars have steel underframe and body frame and are built in accordance with M C B standards. They can be loaded to capacity, operated at high speed and dumped instantaneously either singly or together on straight track or curve. The only labor required for unloading is the operating of a valve in the cab by the engineer of the train.

We will gladly put you in touch with any or all of the forty-five big roads that are now using Western Air Dump Cars. Write us today.

WESTERN WHEELED SCRAPER CO., Aurora, Illinois

Marion

Steam Shovels, Dredges, Draglines and Kindred Machinery

MARION Ballast Unloaders form an important group in the big family of Marion Products—the nine distinct sizes and types which we make have for thirty years been standard with railway systems, here and abroad. Marion Ballast Unloaders can be used on

Straight Track or Curves With Any Material, Coarse or Fine

On curves a snatch block will hold the cable in line.

Marion Unloaders will unload clay, sand, loam, gravel, crushed stone, boulders, blasted rock and similar materials; can be used on common flat cars or ballast cars with hinged side boards. Particulars gladly furnished on request.

The Marion Steam Shovel Company, Marion, Ohio

Branches: Atlanta, Chicago, New York, Philadelphia, San Francisco, Seattle

226 ESTABLISHED 1884

SHERWIN-WILLIAMS

STANDARD STATION PAINTS

FOR BUILDINGS, WATER TANKS, SIGN POSTS, ETC.

A combination of approved materials producing a perfect paint that will resist to the highest degree exposure to the weather, gases and other paint destroying agents to which a paint is subjected in Railway use.

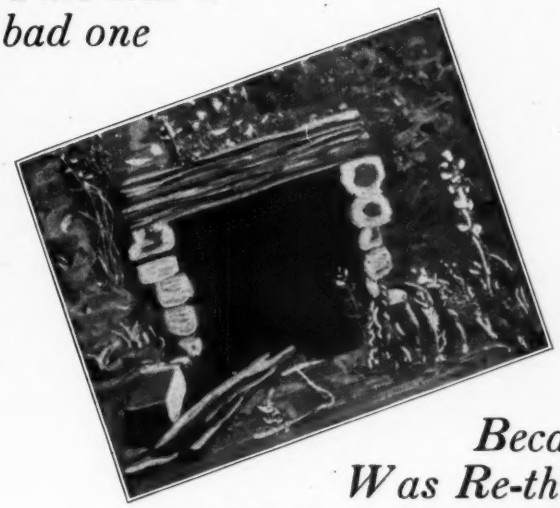
THE SHERWIN-WILLIAMS CO.

Railway Paint and Varnish Makers

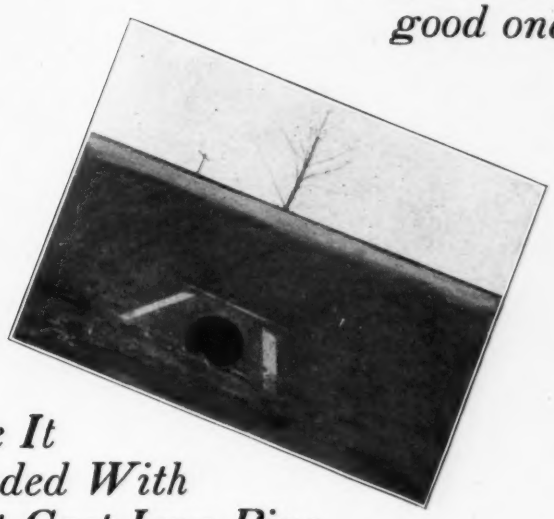
Address Inquiries to

798 Canal Road, N. W. CLEVELAND, OHIO

This was a bad one



Now it is a good one



Because It Was Re-threaded With National Lock-Joint Cast-Iron Pipe

Look These Facts In The Face
Before You Face Your Next Culvert Renewal Problem

How about your Culvert Renewal Expense for 1916?

Rather a good-sized item, was it not?

How about your Culvert Renewal Expense for 1917, 1918, etc., etc.? Looks as if that item in your annual maintenance budget was to be a source of annual regret, is that it?

Then hark! That heavy item is unnecessary, should be, **can be,** cut out; that is, reduced each year till it practically disappears. "Going! Going! Gone!" That's it exactly, "Now You See It and Now You Don't." Sounds like magic, but it is not. It is just sound engineering sense applied to culvert problems, and

National Lock-Joint Cast-Iron Pipe

installed for your culverts, that's all; but how it saves money in annual culvert renewals.

Right now, before you face your next culvert renewals, look these facts in the face.

National Lock-Joint Cast-Iron Pipe, made from remelted Alabama Pig Iron, is as permanent as your roadbed. It comes in short lengths (3, 4 and 5 ft.) that means easy handling. Those little old section gangs of yours will install it without accessory of any kind and without interfering with traffic. Re-thread the old culvert and back fill with cement—that's all; and, what is more, that's all you will hear from that culvert. See how the renewal expense vanishes, growing less each year.

And now, one last word. It is sold by the foot, first cost is low, before you know it you will have **no** Culvert Renewal Problem—"Going! Going! Gone!" The Renewal Expense, Not the Pipe. *Now you see it.*

CATALOGUE AND PRICES ON REQUEST R

AMERICAN CASTING CO.
Birmingham, Ala.
Chicago Office: - Peoples Gas Building
New England Representative
Fred A. Haudiette & Son, Boston, Mass.
St. Louis Representative
H. P. Webb - - Wainwright Building
St. Paul Office
Contractor's Supply and Equipment Co.
Blair & Co., Bankers Investment Co.,
San Francisco, Cal.

What Would You Think of a Manufacturer—

who wrote to you with a stub pencil—"We are saving much money because we do not use typewriters and telephones"? You might well wonder whether his merchandise was as much out of date as his business methods.

You know that modern time and labor saving appliances are not added expenses, but that they have superseded slower and more costly processes.

The concern that uses your business paper to tell you its business story is simply making it easier for you to buy intelligently with the least waste of time on your part and theirs.

For the right kind of advertising shortens the distance between human minds just as certainly as the railroad has shortened the distance between places. It is still possible to walk from New York to Chicago, and it is still possible for a business to get along without advertising, BUT—

—don't forget that the seller who does not advertise, is not only paying for the results that such advertising would get him, but he is also *paying more than necessary.*

Progressive advertisers are progressive merchandisers and it pays to do business with them.

THE ASSOCIATED BUSINESS PAPERS, INC.

The International Association of Trade, Technical and Class Publications

ALL OF WHICH HAVE SUBSCRIBED TO THE "STANDARDS OF PRACTICE."

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American Blacksmith
American Exporter
American Hatter
American Machinist
American Paint & Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile, The
Automobile Dealer & Repairer
Aviation & Aeronautical Engineering
Boot & Shoe Recorder
Brick & Clay Record
Buildings & Building Management
Bulletin of Pharmacy
Canadian Grocer
Canadian Railway & Marine World
Cement World
Clothier & Furnisher
Coal Age
Concrete
Domestic Engineering
Drygoodsman, The
Dry Goods Economist
Dry Goods Reporter
Editor & Publisher
Electrical Review & Western Electrician
Electrical World
Electrical Railway Journal
Electric Traction
Engineering & Mining Journal
Engineering News-Record
Farm Machinery—Farm Power
Furniture Manufacturer & Artisan
Grand Rapids Furniture Record
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Hardware Age
Hide & Leather
Hotel Monthly
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Modern Hospital
Motor Age
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National Builder
National Druggist
National Petroleum News
Power
Practical Engineer
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Railway Electrical Engineer
Railway Maintenance Engineer
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